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THE USE OF SULPHONAMIDE COMPOUNDS IN VETERINARY PRACTICE

DISCUSSION BY THE CENTRAL VETERINARY SOCIETY*

Mr. W. S. King, M.B.E., M.R.C.V.S. (London): The experience now gained upon the value of the sulphonamide compounds in the treatment of acute local and general infections in horses has revealed, to an extent which a few years ago would have been thought incredible by the horse practitioner, the devastation caused by haemolytic streptococci Group C among horses, and the success which has attended specific treatment directed against these organisms by means of the above compounds which have only very recently been put at his disposal through the researches of chemists.

The horse practitioner has cause therefore to be profoundly grateful to the combined researches, on the one hand of bacteriologists, and on the other of the chemotherapeutists. It has been brought forcibly to my notice through these experiences of the last few years how infinite is the gain to be obtained through close collaboration between the busy practitioner and specialised competent laboratory workers. Since the last war the cadre of competent young workers has increased to such a degree that I have now full reason to be assured that no practitioner need feel bewildered in confronting his problems when he has so readily available the willing assistance of his laboratory colleagues. I understand, indeed, that in no country have facilities so rapidly developed for this form of salutary collaboration.

I need not dwell here upon the chemistry or the chemotherapy of the sulphonamide compounds, but merely wish to relate what has been my experience as a practitioner with the use of these agents.

I will leave the more recondite problems concerning the experimental work that has been done upon them to my laboratory friends. I would like, however, to say a few words as a clinician who has had experience extending over 40 years in a large horse practice and enjoyed considerable facilities for carrying out *post-mortem* examinations on cases, on the clinical syndrome and pathological picture revealed in what has been designated in the text books as equine pneumonia.

I do not consider that the picture revealed is ever one of a pure pneumonia but is a generalised condition in which streptococci play the preponderating if not the primary part in the causation of symptoms and lesions and in which invariably besides the pneumonic disturbances there are at an early stage lesions observable in the bowels, namely, in the large colon and frequently extending to the small bowels and stomach.

I have not yet found a case of equine pneumonia among the hundreds I have examined *post-mortem* which has not shown on careful examination lesions of enteritis. Moreover, lesions may also be seen in the spleen, liver, endocardium, bladder, and peritoneum, the petechial spots being strikingly evident. As a symptom discoloration of the urine is usually present. Furthermore, at a very early stage of the disease high fever is very evident, before the appearance of lesions localised in the chest cavity or elsewhere.

My impression therefore is that a streptococcic septicaemia is the prelude to the localised implantation of the bacteria in the lungs, bowels and elsewhere. Saturation therapy with the sulphonamide compounds when it is practised at an early stage of the disease would thus be expected to meet with the greatest degree of success. That, indeed, has been my experience in practice.

It has been brought home to me, largely through the success obtained by sulphonamide treatment, that besides the above generalised streptococcic infection many of the common and serious localised infections observed in horse practice are preponderatingly caused by haemolytic streptococci. Thus " quittor," in its early stages, " sinusitis," arthritis, infections of wounds whether accidental or surgical, yield in a remarkable way to the specific treatment.

Regarding strangles, I have considerable experience in the application of the treatment. Here, however, it has been difficult to assess its value because the cases treated have run a somewhat benign course, as distinct from the occasionally more acute forms seen in those severe outbreaks which usually occur when large numbers of horses are moved from one place to another. Acute forms of this kind were common in the war of 1914-1918.

My first experience in the use of the sulphonamide compounds was in 1936 with prontosil rubrum, a supply of which I obtained from the manufacturers and for which I am thankful. The method I then employed was the injection of the drug by the intravenous route, in doses of 125 c.c. of a 5 per cent. solution, which is 6¼ grammes or 95 grains (approximately $\frac{1}{5}$ of an ounce). I quickly discontinued this method in favour of the intra-muscular one (and our President, Mr. Bywater, can corroborate my reasons for doing so). I increased the doses to 200 c.c. administered during a period of 24 hours.

No striking success was obtained, because, as came to my notice afterwards through the researches of Stableforth and Hignett, the quantity of drug injected was far too low to saturate the animal's tissues to the

*Discussion at a meeting of the Central Division, N.V.M.A. at the Conway Hall, Red Lion Square, W.C.1, on Thursday, May 2nd, 1940.

degree required to exert a chemotherapeutic action upon the streptococci.

The next important development was the finding that the simple compound sulphanilamide exerted a maximum effect when it was administered *per os*, and could be given with safety by this route.

This is a much cheaper preparation and supplies can be easily obtained from chemical firms of commercial repute. The important features of the treatment are :—

(*a*) That the drug should be given as early as possible after the onset of symptoms.

(*b*) That it should be given in fully adequate doses.

(*c*) That treatment should be repeated at *short* intervals if the symptoms have not abated.

At the present time the drug is procured in bulk and it is then put up in hard gelatine capsules for oral administration, each capsule containing 1 oz. of the drug. The doses we have given are from 3 to 5 drachms per cwt. body weight. For the average heavy vanner or cart horse six capsules are given at once and very often this amount will suffice to restore the animal to normality. However, some cases may necessitate a repetition of the above dose on the following day, whilst others may be estimated to require only half this amount, depending on the severity of persisting symptoms.

I can assure my hearers that compared with the old methods of treatment, which in truth had little or no specific therapeutic value, the expenditure on this new treatment is a highly economical one. It is to be hoped that with increasing demands chemical manufacturers will be able to produce the drug at a still cheaper rate. The capsules are administered safely and expeditiously by means of a simple wooden balling gun, a specimen of which I have brought with me for demonstration.

The above form of specific treatment has completely transformed my ordinary course of practice. Never since the treatment has been adopted has any case of pneumonia come for *post-mortem* examination, whereas previously it was quite common for me to see about from four to six fatal cases monthly on an average over a period of several years.

As evidence of the efficacy of the treatment I append summaries of a few illustrative cases.

Case 1.—November 25th, 1938. A bay mare, 12 years old, was reported dull and off her feed, occasionally lying down. This state continued throughout the following two days which were Saturday and Sunday, and I was called on the Monday morning when I found her with pulse 92, respirations 48, temperature 104·2° F.

I 'phoned Dr. Stableforth and informed him of the position, and made arrangements to withhold all treatment until his arrival in the early evening, when he took swabs and blood for bacteriological examination, which I was informed revealed the presence of haemolytic streptococci.

At that period I had just begun the capsule method of treatment and she was given 125 c.c. prontosil rubrum 5 per cent. solution, plus two capsules of sulphanilamide.

The following day I found the pulse 80, respirations 34, temperature 103° F. with occasional colic pains. She was then given two capsules daily and 125 c.c. prontosil rubrum 5 per cent. on the three subsequent days; thereafter she resumed her normal condition.

Case 2.—In December, 1937, a bay gelding, 4 years old, exhibited the usual symptoms of pneumonia accompanied by abdominal pains, with pulse 92, respirations 54, temperature 105·6° F.

The animal received prontosil rubrum (intramuscular injections) in daily doses varying from 125 c.c. to 200 c.c. and he recovered on the twelfth day.

This same animal, in February, 1939, one hour after his veterinary examination at the Agricultural Hall Shire Horse Show, manifested rigors with pulse 84, respirations 46, temperature 106·2° F. This was just under one hour before he was to be judged. Six capsules were given immediately and I decided to allow him to enter the ring.

The changes I noticed during the time he was being judged were that the respirations appeared more intensified, and the absence of a perfect balance during the walk and trot. However, his display was such that he was awarded second prize in his class, the winner being ultimately the London Champion Gelding of that year.

When he returned from the ring to his box I allowed him to stand for just on half an hour, when I found his pulse 98, respirations 62, temperature 107° F. I withheld all food and allowed him a liberal supply of water and on the following morning, when we found his pulse 72, respirations 34, temperature 103·6, he was given three capsules and by the late afternoon his pulse was 58, respirations 22, temperature 101·4° F.

Case 3.—In February, 1939, with Mr. Hignett in collaboration, we had under observation a grey stallion with pulse 64, respirations 56, temperature 105·2° F. He was given six capsules. Next day he showed pulse 48, respirations 18, temperature 101° F., and was returned 200 miles by train.

Case 4.—January 21st, 1938. A bay gelding, one of many affected in a stud, showed the following changes:—

January 21st, 1938.—Pulse 86, respirations 45, temperature 107° F., given 125 c.c. prontosil rubrum.

January 22nd, 1938.—Pulse 84, respirations 40, temperature 107° F., given 125 c.c. prontosil rubrum. In the afternoon he laid down and never rose again as he had lost power, but remained perfectly quiet. I continued for another two days with intramuscular injections of 200 c.c. prontosil rubrum daily. As no improvement was evidenced I had him destroyed and *post-mortem* examination disclosed enteritis, pneumonia, very much enlarged spleen, cystitis, and haematuria; swabs from lungs revealed haemolytic streptococci in pure culture. This case is an example of the inefficacy of treatment when the dose given has been too low.

Case 5.—January 4th, 1939. A bay gelding, 6 years, pulse 72, respirations 34, temperature 105·6° F.

January 5th, pulse 70, respirations 36, temperature 104·2° F.

This animal showed some variations of the above physiological changes. He received in all 15 ounce capsules. Death took place on January 10th, 1939. *Post-mortem* finding: pleuritis and hydrothorax.

This case is given to illustrate what I believe to be the inefficacy of treatment in cases of declared pleurisy.

Cases 6*a*, *b*, etc.—We have treated several cases of purpura haemorrhagica successfully with sulphonamide compounds, but whether or not the recoveries have been the direct result of the treatment I am not prepared to say. The fact is, however, significant that in three cases of purpura, where all the animals had a second attack of this same disease, none recovered after treatment of the second attack.

Case 7.—One morning, in February, 1940, a bay gelding came for observation extremely lame from an acute inflammatory condition of the near hock, the result of external violence, without any dissolution of the skin surface.

I returned to see this case in the afternoon, when I found the pulse 66, respirations 26, temperature 103·4° F. I took swabs from the septum nasi, also faeces, for examination; both revealed haemolytic streptococci. I had with me nothing to enable me to take blood samples for examination.

This animal received six capsules on the first day and three capsules daily for the next four days, when lameness disappeared. A slight swelling remained for some weeks afterwards but has now disappeared completely.

Case 8.—In March, 1940, I saw a bay gelding, aged, lame off fore from a suppurating corn which had broken

through over the region of the lateral cartilage of the inside heel.

Treatment consisted in plugging of the sinus with pledgets soaked in 1:10 acriflavine.

The horse was given six capsules on the first day and three capsules every day for six successive days. The discharge now ceased, though lameness remained for 16 days afterwards. He then resumed work.

Case 9.—The subject of this case, seen March 27th, 1940, was a bay gelding, aged, showing abscess of traumatic origin in the submaxillary space.

I was accompanied by S. L. Hignett, who took swabs from the septum nasi. These disclosed "some long-chained streptococci." There was no systemic disturbance on that day.

The day following his pulse was 62, respirations 26, temperature 103·2. I took samples of blood and faeces for bacteriological examination, and the report (dated April 4th) from S. L. Hignett stated: "Blood streptococci; faeces streptococci; near nostril negative; off nostril streptococci."

Treatment consisted of administering six capsules. The animal's pulse, respirations and temperature became normal next day. The abscess was afterwards opened and a discharge of foetid pus came away.

I have no wish further to enlarge on the foregoing cases and I will conclude by saying that the work done by bacteriologists and chemotherapeutists cannot readily be forgotton by those interested in the science of Veterinary Medicine.

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Mr. S. L. Hignett, B.Sc., M.R.C.V.S. (Veterinary Investigation Officer, The University, Leeds):—

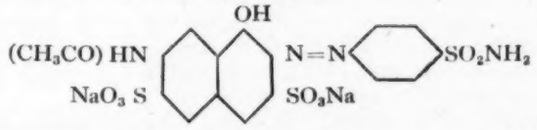
Introduction.—Prior to the introduction of the sulphonamide compounds, members of the veterinary and medical professions were shaking their heads and expressing the opinion that the administration of medicines was an antiquated procedure. These people pinned their faith to various biological products, *e.g.* sera, vaccines, etc., in their efforts to combat disease. Such a policy would practically mean an abandonment of treating the individual and a change over to Preventive Medicine, because, generally speaking, sera and vaccines are of much greater value as prophylactics than as curatives. We all realise—in fact after all that has been said on the subject in the last two or three years by medical people, veterinarians and representatives of the Ministries of Health and Agriculture, one can hardly fail to realise—that there is a great future for Preventive Medicine based upon frequent clinical examination and testing of animals (using to the full the allergic reactions and direct and indirect examinations of blood and milk) together with effective isolation of infected animals.

In this way, diseases such as tuberculosis, contagious abortion and contagious mastitis could be eradicated, as glanders, rabies, rinderpest and contagious bovine pleuro-pneumonia, already have been from this country. Various sera and vaccines can be used to prevent epizootics, but the use of these preparations is of much greater value in countries where, for example, the entire cattle population is liable to decimation by outbreaks of such diseases as rinderpest and contagious bovine pleuro-pneumonia. Preventive Medicine must also include the regulation of nutrition.

Whilst Preventive Medicine is the ideal, a knowledge of this fact is of little consolation to the practitioner called in by a farmer who already has a number of animals suffering from a specific disease. Even if the farmer is prepared to adopt a long-term policy he will at the same time be most anxious that the veterinary surgeon will be able to do something for those animals already ailing.

In addition to treatment of the individual there is a very definite place, I consider, for a drug or group of drugs which can be used as an adjunct to any eradication scheme. We all know only too well that on financial grounds alone all infected animals cannot be slaughtered or otherwise disposed of at once. It is conceivable that many more farmers would adopt various voluntary eradication schemes if one could paint a somewhat brighter picture concerning the infected animals. On the other hand, one must realise that some farmers would never entertain the idea of eradication if infected animals could be successfully treated.

History.—Perhaps it will not be out of place here to survey briefly the history of this new phase of medicine which was successfully launched by the introduction of the sulphonamide drugs. Eisenberg in 1913 showed that certain "azo" compounds had bactericidal properties when used in test-tube experiments. In 1919 Heidelberger and Jacobs pointed out that a certain sulphonamide-containing compound had antibacterial properties. Mietzsch and Klarer then produced "azo" compounds with even greater antibacterial action. It was not until 1935 that Domagk announced that prontosil (a compound containing "azo" and sulphonamide groups),



was capable of protecting mice against very many lethal doses of virulent haemolytic streptococci. This substance was found to be toxic when given intravenously and administration was confined to the intramuscular route. Workers at the Pasteur Institute in Paris produced sulphanilamide

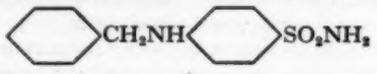
(p-aminobenzenesulphonamide)

which was shown to have a definite anti-streptococcal action. This compound is crystalline and is practically insoluble in water but is rapidly absorbed from the alimentary tract.

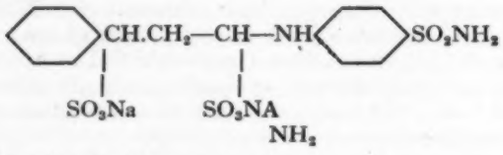
There are two schools of thought as to the way in which prontosil exerts its effect. British and American workers are of the opinion that prontosil in the body is broken down into sulphanilamide and it is this compound which inhibits the growth of streptococci thus allowing the body defence mechanism to overcome the invading organisms. Continental workers (including Domagk) have supported the theory that prontosil has a specific effect on leucocytes apart from any action of the liberated sulphanilamide. Whichever is the truth it is an interesting fact that prontosil has practically no anti-streptococcal action *in vitro*.

There is a great deal of confusion in the minds of many veterinarians owing to the large number of sulphonamide drugs placed on the market by various manufacturing druggists. Their number is certainly legion. Some people refer to them all as sulphanilamide; one or two of them are sulphanilamide (which is not patented) disguised under trade names; others are compounds containing one or more sulphonamide groups and are sold either as solids or in solution. In many cases it would appear that the recommended dose is quite inadequate. Sulphanilamide is also known as white prontosil, prontosil album, sulphonamide-p and streptocide.

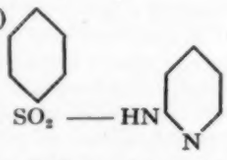
Proseptasine (p-benzylaminobenzene-sulphonamide)



Soluseptasine



M & B 693 (Sulphapyridine)



At one time prior to the outbreak of hostilities new sulphonamide compounds were being produced by the chemists with amazing rapidity. Many of these were more anti-bacterial than sulphanilamide, but unfortunately, toxicity increased with anti-bacterial properties. Apparently the more sulphonamide groups that are present the more toxic is the compound.

Of these various products there is no doubt that sulphanilamide must be first choice for veterinary purposes. In the first place it is by far the cheapest (a not unimportant attribute). Another indication is that it is probably the active breakdown product of prontosil.

When Dr. Stableforth first started his investigations into the value of the sulphonamide drugs there were certain very real difficulties in having milk and blood samples analysed quantitatively for sulphanilamide. As we had to undertake this work ourselves it was an advantage to dose with this drug; in which case it became a straightforward analysis. If prontosil is used, unaltered prontosil must be removed before sulphanilamide can be estimated. The actual estimation can be reduced to a straightforward routine, provided laboratory facilities are available. The final results are read colorimetrically.

It has been accepted that to be effective against streptococci sulphanilamide must be present in a concentration of at least 0·01 per cent. or 10 milligrammes per cent. Dr. Stableforth produced graphs at the Yarmouth Congress showing how the concentration of sulphanilamide in blood and milk is influenced by the amount of sulphanilamide given orally, and the frequency of dosage. I do not propose to spend much time on this aspect of the subject. The findings of Marshall working at the same time in America were the same as those in this country. The concentrations of sulphanilamide in the various tissues (apart from fat and bone) follow closely that in the blood. Our preliminary work was carried out on two fat cows, with the result that when field experiments were started a similar dose of sulphanilamide, weight for weight, produced a much lower concentration of the drug in blood and milk of most dairy cows.

Many people are nervous lest they produce toxic symptoms with sulphanilamide. They are especially nervous when they know that sulphanilamide is the active breakdown product of prontosil. Stableforth has shown that horses, cattle, pigs and dogs will tolerate large doses of this drug. In fact, doses far in excess of those suggested for therapeutic purposes have not been attended by fatal results. Most cows suffer from diarrhoea, a drop in milk yield and loss of appetite when they receive an initial large dose. If dosages continue over a long period there may be some weakness of the hind-quarters and a definite sleepiness. Horses and dogs are rarely upset by this drug. If the former receive very large doses over a prolonged period, there may be some intermittent colic and drowsiness. In the dog, quite alarming nervous symptoms were produced by doses of the order of 1 gramme per 1 lb. body weight. The dogs tried to climb the sides of the cage, but these symptoms which appeared about two hours after dosing subsided rapidly, and the dogs became normal in their habits. The drug is chiefly excreted by the kidneys, consequently if the animal is suffering from functional nephritis excretion does not take place at the normal rate and toxic symptoms are liable to result.

If the sulphonamide drugs are combined with compounds containing sulphur fatalities may result. The antidote, if it can be administered, is sodium bi-carbonate.

Now, turning to the actual uses of sulphanilamide in veterinary practice, Mr. King has already spoken of its value in the treatment of streptococcal infections. As regards cattle, as soon as the anti-streptococcal properties of the drug were established we all hoped that here at last was a rational means of treating streptococcal mastitis. We were further encouraged when we found it was a practical proposition to maintain a concentration approaching 20 milligrammes per cent. in the udder. For years people had been trying to discover a drug which when administered by the mouth was secreted in the milk in sufficient concentration to sterilise the udder. Unfortunately, up to the present the results have not been as spectacular as we would have liked.

We carried out preliminary experiments on an infected cow at the Royal Veterinary College. This animal was a long-standing case of chronic contagious mastitis, *i.e. Str. agalactiae* infection. We found that about eight hours after dosing with 6 drachms per cwt. body weight, the streptococci either disappeared or were greatly reduced in number in the affected quarters. Later the organism re-appeared. It is a fairly constant finding that the streptococci are absent about eight hours after the cow receives a dose of this order for the first time.

Our first field experiment consisted of dosing 47 infected cows three times at two-day intervals with the above dose. These cows were tested twice shortly before treatment, and at least three times over a period of three months after treatment. Only three, or 6·45 per cent., of the cows were cured. The next batch of cows received an initial dose of 6 drachms per cwt. followed by daily doses of 3 drachms per cwt. for five days. Of 36 cows treated, eight, or 22·2 per cent., were cured. Since this result was a great improvement on the first, we increased the frequency of dosing, and after the same initial dose followed up with eight-hourly doses of 1 drachm per cwt. body weight for five days. The results to date are 64 cows treated and 30 cows, or 46·8 per cent., cured. I have also treated 12 cows with the same initial dose followed by ½ drachm per cwt. body weight every four hours for five days. Of the twelve cows five, or 42 per cent., were cured. Altogether these twelve cows had 27 infected quarters, and of these eighteen, or 66 per cent., were cured. Some cows have received the eight-hourly doses for 15 days, and the present records are extremely encouraging, but the number of cows so treated is small, and we must wait for further evidence before reporting on this method of dosing.

I might add that the above cows consisted of some new infections but a preponderance of old-standing cases some of which had failed to respond to other lines of treatment. An outstanding feature was the fact that in most cases where gross changes had taken place in the milk, the latter became

normal in appearance soon after treatment was begun, in spite of the fact that the streptococci persisted in the udder. The acute forms of streptococcal mastitis were resistant to this method of treatment.

The mastitis results agree with the present belief that the sulphonamide drugs are particularly valuable in the treatment of acute generalised streptococcal infections (such as equine pneumonia) but only of limited value in the treatment of localised conditions such as mastitis. Sulphanilamide is of no value in the treatment of mastitis due to staphylococci or *C. pyogenes*. For the former condition an allied compound, Uleron, is probably worthy of a trial, since it is reputed to be effective against the staphylococcus. Long and Bliss report encouraging results with M & B 693 in the treatment of staphylococcal infections.

Since we had noted the disappearance or great reduction in numbers of the *Str. agalactiae* about eight hours after a large dose of sulphanilamide, we thought it would be a good idea to infuse the udder with acriflavine at this time. By this means we managed to cure several long-standing cases which had refused to yield to other lines of treatment, but over a series of cases the percentage of cures was no greater than that obtained with acriflavine alone. Solutions of sulphanilamide injected up the teat canal were of no value.

In pneumonia in the cow, apart from the debatable advantage of an initial reduction in temperature, no benefit has accrued from the administration of this drug. Success has been claimed for sulphanilamide in the treatment of *C. pyogenes* pneumonia in calves, but I cannot say that this has been my experience.

Following an encouraging report by Dr. Montgomery on the administration of sulphanilamide to guinea-pigs which had been infected with *Brucella abortus*, we carried out several field experiments on some 60 infected cows. These were blood tested at least twice before treatment to ascertain whether the titre was ascending or descending. After a course of sulphanilamide (6 drachms per cwt. initial dose followed by 3 drachms per cwt. daily for five days) the animals were blood tested at regular intervals for twelve months, but there was no appreciable fall in the titre which it was decided should be regarded as evidence of overcoming infection.

I should like to try fairly large doses of sulphanilamide in the treatment of pyelonephritis in the cow. Not that I consider this drug has any specific effect on the organisms usually responsible, *e.g.* Corynebacteria, but sulphanilamide is excreted in the urine in such high concentration that it is then detrimental to the well-being of any organism. This has been the experience of the medical fraternity. Pyelonephritis in children due to coliform organisms was formerly nearly always fatal. Now most cases are cured with sulphanilamide in spite of the fact that the drug has no specific anti-coliform properties. It is interesting that a dose of 6 drachms of sulphanilamide per cwt. body weight in cattle gives rise to such a high concentration of the drug in the urine a few hours after administration, that it crystallises out as rapidly as the urine is voided. The crystals can be seen in the gutter and on the standing behind the cow. All cows receive the drug in the form of a drench, the sulphanilamide being suspended in water.

We used sulphanilamide in a few cases of canine pneumonia. These were treated in conjunction with Professor McCunn. Although only very few in number the results were most encouraging. The drug was also used on several bitches which, owing to a streptococcal metritis, were unable to carry puppies full time, or if the puppies were born normally they died due to a streptococcal infection contracted *in utero*, or from the bitch's milk.

Some cases responded favourably, others were disappointing. The drug was given in capsule.

Sulphanilamide has been used in the streptococcal infection of piglets, in which joint lesions are commonly found. The most successful results were obtained by giving the drug in the sow's food.

There is evidence that the drug is of considerable value in treating joint-ill in foals. It has been found that it is a useful plan to dose mares which have previously had infected foals immediately after foaling. In these cases the drug is administered in capsule.

I have tried using solutions of sulphanilamide to irrigate wounds, *e.g.* post-operative fistulous withers wounds in horses, since they are readily infected with Group C. streptococci, but I cannot say that this line of treatment is any improvement on the more usual methods.

I should like to emphasise here that whenever the drug is used internally the large initial dose is extremely important.

Lastly, I hope that our information to-day will help to clarify the position of sulphanilamide as a drug, emphasising where it fails as well as where it succeeds—because I trust you will agree that it undoubtedly has a legitimate claim to be included in the veterinary pharmacy, and it would be disappointing if by being launched as a cure-all it falls into temporary disrepute as so many otherwise useful drugs have done in the past.

I should like to pay tribute to the invaluable co-operation we received from veterinary surgeons in the South, particularly Messrs. W. S. King and R. C. U. Fisher. I am pleased to say that members of the Ministry of Agriculture Inspectorate and practitioners in Yorkshire are continuing this indispensable service.

Mr. D. T. Reid, speaking with special reference to the place of drugs of the sulphonamide group in cattle practice therapeutics, expressed the opinion that sulphanilamide did not represent, in the treatment of mastitis, that much-to-be-desired "cure which the country practitioner will be able to guarantee to his clients." In support of this contention, Mr. Reid gave details of cases in which, early last year, he had given sulphanilamide a trial, these being selected cases—bearing in mind the nature of the infection, the breed of the cow and, last but not least, the common sense of the stockmen who had to administer this, to them, unknown and potentially dangerous drug.

Three dairy Shorthorns, given approximately 2 lb. of prontosil, each over a week, showed no improvement. With Guernseys and Jerseys rather more favourable results were secured, as the administration of sulphanilamide, and putting two calves on the cow to remove the persistent clots in the milk, would clear up a subacute mastitis in a week or ten days. Cows which were difficult to dry off were given a three weeks' course—15 tablets daily—and one could not fail to appreciate the splendid condition of the udders of such cows when they calved down. One first-calver Guernsey was given 2 lb. prontosil album in an attempt to clear up endometritis associated with Corynebacterium infection, but no apparent good resulted.

He believed that sulphanilamide would find a place in the treatment of white scour in calves, as several had recovered with the administration of three tablets, one at a time, in each of three feeds of equal parts milk and water.

Mr. Reid concluded by expressing the hope that practitioners would give sulphanilamide a fair trial in the treatment of mastitis in cows; also that the Ministry would provide facilities for the laboratory examination of material from clinical cases and the receipt by the practitioner of advice and expert findings at only a nominal cost—"Agriculture cannot afford fancy prices for fancy diagnoses."

Dr. Tom Hare said that previous speakers had commented on the contradictory results following treatment of *beta haemolytic streptococcus* infections by the sulphonamides. Possibly some of this confusion was due to an imperfect appreciation of how the *beta haemolytic streptococcus* behaved in the body. He wished to emphasise the importance of recognising the variety of clinical syndromes caused by the *beta haemolytic streptococcus* in horses, dogs, cats, pigs and cattle. In these animals, as in man, the clinical manifestations of the infection were protean. Great strides had been made in recent years in our understanding of how the *beta haemolytic streptococcus* behaved in the diseased animal, and it was a mistake to restrict our outlook on this problem to the old-fashioned notion of strangles, purpura haemorrhagica, metritis, etc., as specific entities. They were merely part of the clinical expression of the actions of the *beta haemolytic streptococcus*, which for brevity's sake he would call the B.H.S.

The B.H.S. commonly gave rise to one or more of the following syndromes in the animals mentioned. In the first place it might cause septicaemia, for which the sulphonamides were of particular value. Secondly, the B.H.S. might settle in special tissues producing the clinical signs, for example, of pneumonia, endocarditis, nephritis, etc. It might settle in the lymphatic glands of the neck and upper respiratory tract, including the tonsils, producing catarrh, tonsillitis and adenitis of the cervical glands, which in the horse, was our picture of strangles; whence it might pass into chronic sinusitis with or without osteomyletitis. The B.H.S. might attack the capillaries, producing the syndrome of purpura haemorrhagica. Again, it commonly settled in the genital organs, particularly the uterus, giving rise to metritis, sterility and abortion. Then there was the third group of syndromes due to the action of the B.H.S. on the newly born; in his experience the majority of cases, which were fatal within 48 hours of birth, were due to absorption of B.H.S. toxin from the infected uterus of the dam; that is to say, the B.H.S. was not usually present in the tissues of the foetus. But in the case of the young animal born of an infected dam and living for some four to seven days or more, the B.H.S. was almost invariably recoverable from the tissues of the youngster at *post-mortem*. Fourthly, he wished to emphasise the variety of skin lesions due to the B.H.S. infection. Frequently, the initial lesion of the skin was a macular rash passing into small pustules or into an exfoliative dermatitis with intense pruritus, which resembled the peeling of the scarlet fever rash in man. Boils, acne, purulent otitis, pustular dermatitis, cellulitis, and grease were other forms of the B.H.S. dermatitis. Another variety of B.H.S. dermatitis, common in the horse, but also observed in dogs and cattle, was a circular patch of necrosis of the superficial epidermis and hair about the size of a threepenny piece, which was often mistaken for ringworm. Vesicles on the skin, or impetigo, as on the teats of cattle, on the pads of the dog's foot, and on the lips of horses, were yet another form of B.H.S. dermatitis.

Such a rapid and very incomplete sketch of the pathogenesis of the B.H.S. infection showed that in only a relatively small proportion of clinical cases, namely those of septicaemia, did the organisms remain in the blood stream; usually they settled in one or more tissues of the body. Sulphonamide in the blood was bacteriostatic, *i.e.*, it interfered with the growth of the organisms, but it did not destroy them. It was by no means clear that sulphonamide exerted any specific detrimental effect upon the B.H.S. in the tissues. Thus while excellent clinical results might follow the administration of sulphonamide in septicaemia or acute pneumonia, probably little or no result would follow its administration in cases of nephritis, tonsillitis, mastitis, metritis, dermatitis. In his opinion it was a question of how long the B.H.S. had been settled in the tissues, and what amount of inflammatory reaction enclosed the organisms in the tissues. In order to exert its bacteriostatic effect sulphonamide must pass readily through the blood to the organisms, and if these were shielded by layers of inflammatory tissue the drug would not reach the organisms. This probably explained the failure of sulphonamide in curing bovine mastitis.

At this point he would take exception to Mr. Hignett's conclusion that vaccine was of no value. He wished to call attention to the valuable work by Professor A. Fleming (*B.M.J.*, 1939, *ii*, 99; and *J. Path. and Bact.* 1940, **50**, 69) explaining the synergic action of vaccine therapy with chemotherapy. Sulphonamide did not destroy the B.H.S.; the organisms were destroyed by the leucocytes, *i.e.*, by the animal's defence system. As Fleming showed, the higher the animal's resistance the better would be the *apparent* results of administering sulphonamide. Thus when the B.H.S. was in the tissues we must be careful not to attribute the beneficial effects of treatment to the sulphonamide administered, since the effects might have been due to the animal's resistance on which the drug had no effect. On the other hand an animal's resistance to the B.H.S. was activated by autogenous vaccine provided it was properly made and properly administered. Thus in general practice our procedure with febrile cases of B.H.S. infection should consist of the combination of vaccine and sulphonamide in order to obtain the synergic action, *i.e.*, better bacteriostasis and better resistance.

Another difficulty arose over the case of B.H.S. infection which became clinically healthy after treatment. He was hoping soon to publish details of further work on the B.H.S., which showed that after clinical recovery a not negligible proportion of animals remained "carriers" of the B.H.S. He had found that the B.H.S. was capable of living and multiplying in the mucus on the surface of the tonsil, prepuce, endometrium and vagina without causing signs of ill-health for varying periods over several months, after which these "carriers" suffered a relapse, though usually milder than the attacks preceding vaccine treatment. The relapse was due to toxaemia, the B.H.S. toxin being absorbed from the site of multiplication of the organisms on the mucus surface. He thought these observations helped to explain how the B.H.S. infection remained endemic in stables or kennels, or in other words, how the B.H.S. infection recurred in a community months after the clinical clearing-up of an epidemic. His observations did not encourage him to believe that sulphonamide had any effect upon the types of "carriers" he had defined. Obviously, the only way of detecting these carriers was by bacteriological methods; in fact it could not be emphasised too much that efficient curative and preventive treatment of the B.H.S. infection necessitated the close collaboration of clinician and pathologist.

He would conclude with a few remarks on particulars of treatment of B.H.S. infection. Whenever B.H.S. infection resulted in the formation of pus, and local pus formation was very common—*e.g.*, empyema, purulent glands, sinusitis, purulent metritis, cellulitis, quittor—the surgical liberation of the pus was necessary; in the case of purulent metritis hysterectomy was indicated. Certainly sulphonamide therapy was no substitute for surgery in such cases. Secondly, clinicians should avoid prolonged administration of sulphonamide; in fact, he had been led to advise his colleagues to refrain from sulphonamide therapy unless the patient showed three or more degrees of fever. In acute septicaemia or pneumonia the drug should be stopped once the temperature dropped below 104·5. Once the fever waned, the clinician would recognise that bacteriostasis had occurred and that the task of destroying and removing the organisms should be left to the patient's leucocytes reinforced by vaccine and by good nursing and feeding. Probably we should all be the wiser and better therapeutists if we tried the effect of overdosing ourselves with sulphonamide before applying it to our animal patients in the blind irrational manner of certain current practice. Too much sulphonamide was not a good thing.

Lt.-Colonel Greenfield said that he would like to lay emphasis on the point made by Dr. Hare that these drugs should not be used at times when surgical procedure should be adopted. One particular case he had in mind was one he knew intimately where the patient nearly lost the use of the left arm, which was treated by that drug for weeks before surgery was adopted. But there was one class of case in veterinary practice in which drugs of the sulphonamide group did seem peculiarly and sometimes spectacularly successful, and that was in pyometritis. He was persuaded to try sulphanilamide on one case and he had used it since on five or six cases in which recovery had been remarkable; indeed, in one or two instances almost instantaneous. In view of its effect on the uterus of the bitch he thought it would be worthy of experiment to try it on the cow. He had one farm where there was little actual definite abortion: there were a few cases of retention of the placenta, but there was practically no cow holding to the bull. This farm belonged to two well-trained men and therefore he thought their observations were accurate. A blood test was done on six or seven cows to assure them that the condition was one of contagious abortion and it was positively the case. Four of these cows were given approximately 10½ oz. sulphanilamide in eight days. After a while the treatment seemed a most decided failure, for after coming into season continuously for some months none of them came into season for seven weeks; subsequently, however, all the cows came in season and then they all held to the bull. In two different periods, but all at the same time, other cows were inoculated with live vaccine and the reports were that about half of them had "held" to date.

On the clinical side he felt it his duty to report a few extraordinarily successful results from the use of drugs of the sulphonamide series in cases that one might call almost *in extremis* with distemper. As an example, a six-months-old Border terrier was brought to him in January last with the history that it had fits but had never had distemper and there was no question of infection. About four days afterwards the dog showed definite nervous twitching throughout the body with grinding of the teeth, but the owners were not prepared to accept his diagnosis that these were nervous symptoms subsequent to distemper. Nine days afterwards the dog was staggering and falling about with partial paralysis and chorea and he advised destruction. The owners decided on treatment, however, and he told them he would give the dog a course of three injections. In this class of case he had given sulphonamide compound combined with antibacsyn if the temperature was low, or combined with prontosil if the temperature was high. He gave the first dose on January 28th. The dog was almost comatose when it came for the second dose (January 29th), but as he (the speaker) was rather stubborn in the matter of carrying out a course of treatment when he had decided upon it, that dose was duly administered. On the following day the animal was taking a little liquid—that was January 30th. On February 4th the dog was walking fairly well and by the 10th he was looking very bright and wandering about, while by the 16th he was perfectly well.

Another case he had under treatment at the moment was a wire-haired terrier which had had a perfectly normal attack of distemper—vomiting, diarrhoea, temperature 103·4°, pulse 120. He gave the dog 30 c.c. distemper serum and for eleven days the animal was perfectly all right. Then the temperature started to rise; by the 15th of last month, *i.e.*, 13 days afterwards, there was a definite cough, the tonsils were enlarged and inflamed, and he thought there was little doubt that it had superimposed streptococcus infection. On the 18th day the dog's eye had the peculiar rosy scarlet colour of impending meningitis—it could not walk properly. He gave the dog on three successive days an injection of prontosil. Six days afterwards the dog had a temperature of 103·4°, but otherwise was perfectly normal. He turned him over to aspirin, the temperature dropped to normal, and that morning it appeared to have recovered completely. It did appear at times that drugs of that group were very effective when nothing else seemed to be of the slightest use.

Then he came to the next group. For the past twelve months in his district they had been inundated with a definite streptococcus infection—relatively large red tonsils and fauces and enlargement of glands of the neck. One of his professional neighbours and himself agreed that it was almost impossible to decide whether a dog had streptococcus infection or distemper, or possibly both. In this class of case he had found nothing to have any effect except sulphonamide: since he had used drugs of this group he had had complete success in treating these cases. Many of them suffered severely from diarrhoea, and he had had success in treating this symptom by giving either Dover's powder or ipecacuanha as well.

Mr. D. G. Ardley of May and Baker, Ltd., having expressed his appreciation of the action of the Secretary and members for inviting his colleague, Miss Weddell, and himself to the meeting as representatives of a commercial firm, said that he had hoped that his colleague, who is a veterinary surgeon, would have spoken, but her modesty seemed to have prevented this and so he had to act as an inadequate substitute. He would, therefore, comment on a few of the more scientific aspects of the subject under discussion since he should not be competent to deal with the clinical side. He had listened, however, with very great interest to the paper by Mr. King describing such striking results in the chemotherapy of haemolytic streptococcal infection in the horse. A trivial point to which he would draw their attention was that both Mr. King and the next speaker, Mr. Hignett, referred to the intramuscular and intravenous injection of prontosil rubrum, but no doubt prontosil soluble was intended, as the former is insoluble in water and employed by oral administration. This was a mere slip but he held, rather emphatically, the view that in view of the number of chemotherapeutic agents now in use and the far greater number which would probably be introduced in the future, accuracy in nomenclature was of considerable importance. He had actually read papers published by clinicians which were admirable in all respects save one, that being that, owing to incorrect terminology of the drugs used, it was impossible to know exactly which of several possible chemical compounds had been employed.

Mr. Hignett had referred to its being thought that the azo dyestuff sulphonamides are broken down in the body with the release of sulphanilamide. That this takes place was originally shown by the Tréfouels, Nitti and Bovet working in Professor Fourneau's laboratory at the Pasteur Institute in Paris, and it had, of course, been fully confirmed since, sulphanilamide being recoverable from the urine after administration of the coloured compounds. Mr. Hignett referred to sulphanilamide being taken up by all tissues except bone and fat. Small concentrations were, however, found in these tissues but the low level reached was, of course, of practical importance in the treatment of infections situated in such tissues, for example, acute osteomyelitis.

He was interested to hear of the alarming symptoms which may be produced in horses by sulphanilamide, but failed to see any reason why such symptoms should be associated with giving sulphanilamide in conjunction with sulphur. If, as had been stated, these symptoms were due to acidosis and were effectively combated by the administration of sodium bicarbonate, he could not see that the administration of sulphur had any connection with the matter. The symptoms described were similar to those which may be regularly produced in laboratory animals by large doses of sulphanilamide resulting from an action on the central nervous system independent of acidosis and he should have thought that those horses affected after therapeutic doses were examples of a similar action on the central nervous system, in this instance some unknown factor being concerned in the production of these symptoms with a much smaller dose than that

used in the laboratory experiments. If, however, the administration of sodium bicarbonate was an effective antidote this would appear to support the view that acidosis is the causative condition and, as was well known, sulphanilamide produced a fall in the CO_2-combining power of the plasma, an effect which sulphapyridine did not appear to bring about.

The treatment of young animals such as piglets and foals through the mother's milk by administration of the drug to the dam during lactation would probably be found convenient in clinical practice, but it would seem that the dosage obtained by the young animal in this way would be somewhat uncertain and variable. In addition it must be borne in mind that most animals, the dog being a notable exception, partially convert sulphonamides to an acetyl derivative in the liver. This acetyl derivative, while less toxic, was also much less active and the drug in the milk would, therefore, occur partly as the free active body and partly as the inactive conjugated form.

In connection with Mr. Hignett's reference to crystals forming in the urine of animals being treated with sulphanilamide, he would like to ask him if these crystals were of sulphanilamide or its acetyl derivative, as the latter was much less soluble. It would appear to him that when sulphanilamide was administered to animals in a dosage which resulted in a deposition of crystals in the urine, haematuria might occur and cases of urolithiasis had been observed in the human subject during treatment by sulphonamides of low solubility such as sulphapyridine. With the latter the possibility of this was greater since, just as the acetyl derivative of sulphanilamide was less soluble than the free form, so was the acetyl derivative of sulphapyridine less soluble than sulphapyridine itself. This effect could be prevented by ensuring an adequate fluid intake and this point might perhaps be of interest to veterinary clinicians employing this therapeutic agent.

In connection with the treatment of pyelonephritis Mr. Hignett had stated that the successful use of sulphanilamide in this condition was due to the high proportion in the urine, as the drug was inactive on coliform organisms. This, however, was not the case as, although animal assessment of the chemotherapeutic activity of the compound against coliform organism was unsatisfactory owing to the low pathogenicity of these organisms for laboratory animals, *in vitro* testing showed that sulphanilamide and sulphapyridine would inhibit the growth of these organisms and do so in a low concentration which was readily obtainable in the body fluids. In this connection it was, of course, of interest that these chemotherapeutic agents had an activity in experimental animal infections with *B. typhosus*.

The members of the society would no doubt wish him to say something about the famous product discovered and introduced by his firm which has since come into world-wide use for the treatment of certain human infections. He had referred to it previously by the name sulphapyridine—a name he did not like, but one which, since its introduction by the Americans, had come into wide use—as he felt that in a discussion of that nature it was desirable to avoid the use of proprietary names provided a simple and generally understood designation was available. He noticed, for example, that some speakers referred to brands of sulphanilamide by proprietary names and felt that this was better avoided since the term sulphanilamide covered the compound whatever particular make of it happened to be employed by the clinician.

For various reasons the application of sulphapyridine to veterinary therapeutics had not hitherto been extensive, partly because the production had mainly to be used for the treatment of human patients, although there was the very important practical difficulty that the compound could not be produced at a low price so that, at least in the case of large animals, treatment by means of it might in some instances be rather uneconomical.

They had received a number of enquiries from members of the veterinary profession concerning the application of sulphapyridine to the treatment of pneumonias in domestic animals and what dosage and mode of employment they would advise for the purpose. In this connection it would, of course, be borne in mind that sulphapyridine was the outcome of researches aiming to find a compound possessing an activity on pneumococci comparable to the activity of sulphanilamide on virulent Griffiths strains of Lancefield's Group A haemolytic streptococci and having a sufficiently low order of toxicity to justify its clinical trial in the treatment of human lobar pneumonia or other pneumococcal infections.

The pneumonias of domestic animals being rarely, if ever, of pneumococcal origin, it would not appear that sulphapyridine had any essential application in the treatment of animal pneumonias as it had in pneumonia in the human subject. In the pneumonias of the horse due to Group C haemolytic streptococci it would not appear that the use of sulphapyridine would be indicated unless it could be shown that it had a markedly greater bacteriostatic effect on the causative organism, except possibly for trial in cases failing to show the response usually expected from the administration of sulphanilamide. Mr. Hignett had referred to sulphanilamide as being practically insoluble in water; it was soluble in water at ordinary temperatures to approximately 0·8 per cent., but even this degree of solubility was a factor of considerable importance in connection with its therapeutic use. Sulphapyridine had a solubility of approximately 1 in 4,000 and on account of this its absorption from the alimentary tract tended to be somewhat irregular and uncertain in some individuals compared to the absorption of sulphanilamide.

Sulphapyridine, in addition to possessing a very high degree of activity on a number of organisms susceptible to the action of drugs of the sulphonamide group, was also active on a wider range of organisms and this latter, might he suggest, provided applications for the use of the drug in veterinary therapeutics since it might prove to be useful in animal infections which were resistant to sulphanilamide. Mr. Hignett, in describing trials of sulphanilamide for the treatment of bovine mastitis, had stated that cases due to staphylococci and the *Corynebacterium pyogenes* were completely resistant.

Animal assessment of the activity of a chemotherapeutic agent could readily be carried out as regards pneumococci and Group A haemolytic streptococci, but it was difficult to determine the activity of these agents in staphylococcal infections by this means. It had been shown, however, that sulphapyridine possessed a higher degree of activity in experimental staphylococcal infections than sulphanilamide, at least as regards the particular strains of *Staphylococcus aureus* used in such experiments, and a number of human cases of *Staphylococcus aureus* septicaemia had shown a rapid and marked response to administration of the drug which could not but be attributed to its therapeutic effect. There was evidence also that sulphapyridine had an action in infections by the *Corynebacterium pyogenes* and they had received a number of unpublished reports of quite striking therapeutic results in cases of calf pneumonia due to this organism, cases having also been described in the veterinary literature. It would appear, therefore, that the clinical trial of sulphapyridine in cases of mastitis due to these organisms would be justified and that a therapeutic response might possibly be obtained. While it was generally agreed by authorities that of the sulphonamide drugs in general use sulphapyridine was the most active in use for staphylococcal infections, a number of cases of *Staphylococcus aureus* infection had failed to respond to its administration and it appeared that resistant strains of this organism were common. Attention had recently been directed to the therapeutic activity of a group of compounds known as the thiazoles in which the pyridine group of sulphapyridine was replaced by a thiazole group, and claims had been made by American workers that compounds of this group

were more active than sulphapyridine against *Staphylococcus aureus*. As far as we in this country were concerned, these compounds were by no means new, a number of them having been synthesised during the course of the researches in connection with the introduction of sulphapyridine to which he had previously made reference. In view of the American claims these thiazoles were being resubmitted to laboratory studies and a number of clinical trials in the human subject were in progress to determine their possible usefulness in therapeutics. As far as he was aware the thiazoles had not been employed in veterinary therapeutics, certainly not in this country, but if the preliminary laboratory and clinical investigatons revealed that the thiazoles possess marked therapeutic activity their use would no doubt be extended to the veterinary field. It was too early yet to say in what direction, if any, these compounds would be employed by clinicians, but even if certain of the thiazoles should prove valuable aids in the management of staphylococcal cases it would appear that they would not completely solve the problem of the chemotherapy of staphylococcal infections. The chemotherapy of these infections was, of course, likely to be attended by certain difficulties, particularly in view of the tendency of staphylococci to localisation and, as Dr. Hare had pointed out, chemotherapy could not be a substitute for the evacuation of a collection of pus in accordance with well-established surgical principles. The activity of chemotherapeutic agents was greatly lessened by the presence of pus so that the tendency to local abscess formation in staphylococcal infections was likely to prove a difficulty in the way of their successful treatment by these synthetic agents.

These investigations into the chemotherapy of bacterial infections had not resulted in the neglect of protozoal infections which were, of course, of such great importance as regards domestic animals in many parts of the Empire, and a number of compounds of a chemical nature not hitherto used in therapeutics had been found to be highly active against a number of trypanosomes (and piroplasms affecting animals as well as man). Following on the original work of King, Lourie and Yorke on the trypanocidal activity of a number of guanidines, isothioureas, anidines and amines a number of allied compounds were prepared by Dr. A. J. Ewins and co-workers in the research laboratories of Messrs. May & Baker Ltd. which had been found to be powerfully curative in infections by *Babesia canis* and by certain leishmania and trypanosomes.

While these results were of a preliminary nature they opened up a new field of chemotherapy which might lead to advances in the treatment of protozoal infections of both man and domestic animals.

Mr. J. J. Davies staed that his practice was entirely with small animals and treatment with drugs of the sulphonamide series had become a routine measure with him. He found the best response in cases of congestion of the lungs in dogs and in metritis: but so far he had not tried it in cases of pyometra. The cases in which he had not achieved success were the septicaemic cases, which settled down to generalised arthritis. Having read that their Irish colleagues in Belfast had success in a similar condition in pigs with sulphapyridine, he put one dog on to this treatment with a very good result.

The Replies

The President said that if there were no other speakers, if those who opened the discussions would care to reply to any point he was sure the meeting would be pleased to hear them.

Mr. King said that he was afraid that Dr. Hare had rather misunderstood him: he fully realised that drainage was necessary in certain infections and that surgical interference with such conditions as, for example, quittor or other conditions affecting the sinuses and other structures, was essential for the liberation of pus. Nevertheless he had had many good results from using acriflavine, in conjunction with sulphonamide substances, in the treatment of local conditions in the horse caused by streptococcus infections. He had found that the horse was particularly prone to systemic disturbance in localised infections, and when he suspected that infection of the blood was about to take place, he used the capsules and he believed that thereby in many instances he had avoided generalised infections.

Mr. Hignett said that Dr. Hare, in speaking of the leucocytic defence mechanism of the body as an essential factor in the response made to the therapeutic action of drugs of the sulphonamide series, had said that was where he (Mr. Hignett) had slipped up—but he still failed to see exactly where that was. In his paper he had emphasised the fact that the sulphanilamide had a bacteriostatic action: he had stated that it was the defence mechanism which overcame the invading organisms. He did not refer to a combination of the drugs and vaccines because he himself had done no work on the subject. At the Royal Society of Medicine last year he had heard an interesting contribution on the sulphonamide drugs plus serum. It was shown that a dose of sulphanilamide which would not protect a mouse, when combined with a dose of serum which by itself would not protect a mouse, would then do so. Mr. Fisher and he had planned to do some work along these lines.

In reply to Mr. Ardley, he was not aware that he had used the term red prontosil; he was talking about prontosil soluble when he (the speaker) was referring to the intramuscular route. With regard to his query in connection with sulphanilamide in the urine, he could assure Mr. Ardley that he had collected these crystals himself. They had been analysed and the chemist had assured him that they were pure sulphanilamide. Mr. Ardley had raised the question of coliform organisms—he (Mr. Hignett) erred there: he was basing his information on the lack of published experimental data on work dealing with laboratory animals.

In connection with the milk of the dam, he had done no actual experimental work in laboratory animals, but he had done some field work with ewes and lambs. They gave the ewes large doses of sulphanilamide and at varying periods after dosage they took blood from the lambs, when they found that the lambs had a fair concentration in the blood: as far as he remembered it was somewhere in the region of 7 milligrammes per cent.

Mr. Ardley referred briefly to the remarks of Mr. Hignett and Dr. Hare, saying that whereas one could see that the concurrent administration of the chemotherapeutic and serum might prove of greater therapeutic value than either alone, it appeared to him that there was some doubt on the subject of the enhanced value claimed by associating vaccine therapy with chemotherapy: if, as had been suggested, the value of the administration of vaccine was to stimulate leucocytosis—it being of course the case that these chemotherapeutic agents were bacteriostatic and that the infection had to be ultimately overcome by the body defence mechanism. Instancing cases of human lobar pneumonia with a leucocytosis of say 20,000 to 40,000 and a high proportion of neutrophil polymorphs, it was difficult to see that such a leucocytosis was not adequate or how the concurrent administration of a vaccine was needed if the action of the vaccine was to stimulate the leucopoietic function. As such an action would be quite non-specific other substances were available for the purpose and the use of an autogenous vaccine would appear to be unnecessary.

Dr. Hare contributed further observations on the question of making a vaccine to stimulate leucocytosis with special reference to the value of the simultaneous administration of the chemotherapeutic agent and a vaccine.

At Hereford Market Committee the Town Clerk submitted a letter from the Ministry of Health in which the Ministry stated that the question of meat inspection was under consideration, but that there were no funds available to assist the Council in meeting any additional expenses.

THE VETERINARY RECORD
June 22nd, 1940.

"RESERVATION" OF THE PROFESSION

In recent weeks there have appeared in the columns of the *Veterinary Record* letters expressing individual points of view for and against the continued reservation of the veterinary profession. Once again, therefore, we recapitulate certain facts regarding this reservation.

The profession was first scheduled as a "reserved" occupation by the Ministry of Labour and National Service after consultation with other Government Departments as a primary measure for home safety and not because, at that time, there was a scarcity of veterinary surgeons. Subsequently, it was decided that the reservation of the profession should be completed by the reduction in the age limit from 25 to 21, and extended to include students after they had passed the second qualifying examination.

The "reservation" of the profession has been under continual and earnest discussion; nothing has been left undone by the officers of this Association or other interested bodies to keep the position under review. For reasons which we are still unable to disclose, the Ministry of Agriculture and other Government Departments have foreseen circumstances in which the entire personnel of the veterinary profession may become fully occupied in safeguarding the livestock of the nation.

We would, however, emphasise that, as published in the *Veterinary Record* of March 30th last, it is possible for any veterinary surgeon to join any of His Majesty's Forces by getting the Commanding Officer of the unit which he desires to join to make application for his services. We are assured that if the services of the individual making application are not considered by any other Government Department to be essential to that Department, then the veterinary surgeon will be allowed to join. Those who wish to join the Forces may thus find a way of accomplishing their immediate aims.

As intimated elsewhere in this issue, within the last few weeks, at a conference attended by representatives of the War Office, the Ministry of Labour and National Service, and the Board of Education, which was held to discuss the bearing of the War Office appeal for volunteers for Home Defence upon university students, it was agreed that veterinary students could still render the best National Service by continuing their studies.

Much has been written and more said concerning the unemployment in the profession. We appreciate that unemployment does exist and this Association has taken, and will continue to take, energetic steps towards solving or ameliorating this problem which is one of many facets. We would remind our readers that it was recently announced by the Ministry of Labour that members of reserved occupations who had been unemployed for two months might be considered free to join any of His Majesty's Forces.

A collateral problem of extreme gravity is that of practices, incomes from which are so drastically depleted as to render their continuance well nigh impossible; this situation is also giving the Association grave concern and various channels are being explored with a view to mitigating this position.

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THE STOCK REDUCTION DECISION

ON June 2nd the Minister of Agriculture and Fisheries broadcast to the nation a statement on agriculture in which he referred to feeding stuffs for animals. He made it clear that there must be a drastic cut in imported feeding stuffs, so that additional shipping space would be made available for essential war materials. As the country is dependent on foreign supplies for much of our feeding stuffs, the Minister had to decide how the available products could best be used. He has come to the conclusion that the following is the order of preference for the classes of animals for which the foodstuffs will be made available—dairy cattle, beef cattle, sheep, pigs and poultry. Concerning the last two, which are grouped in the same category, the Minister said "I have left pigs and poultry to the last. Supplies of feeding stuffs for them will be very limited indeed. . . . I regret to say that the demand may be there but the feeding stuffs won't be." He then went on to say that breeding and hatching should be curtailed at once and that pig and poultry farmers who are dependent on purchased feeding stuffs should begin at once to reduce their stocks gradually, for by the middle of the autumn it may be necessary for such stocks to be cut down to one-third of their present numbers.

There is little doubt that the position concerning imported feeding stuffs generally is acute and may become worse. During the summer months when many animals are kept out of doors and are fed to a considerable extent on grass and green crops, the shortage may seem less apparent, but it will surely be felt later in the year unless steps are taken now to lay up stocks for use during the winter months. The conservation of stocks of feeding stuffs must be regulated by the amount forthcoming from abroad and those released during the summer months. Farmers who can produce some of the food for their animals will be in some measure in a better position than those who rely entirely, or almost so, on imported products.

The reduction of stock is certainly the simplest method of dealing with the situation. It may seem hard that the number of pigs and poultry may have to be reduced so drastically but, without doubt, the Minister has good reasons for the decision which he has made.

There are other methods, however, in addition to

the reduction of pigs and poultry, which should also be considered. The home production of feeding materials in increasingly large quantities is essential. Farmers are making a great effort in this direction and more and more is expected from them. The feeding of substitutes for the commonly used foodstuffs should now be taken up in earnest. We believe that experiments are in progress in this country, the results of which may be of the greatest possible value in relieving the animal food situation. As results materialise they will doubtless be made known and used to the greatest advantage.

It is imperative that animals of uneconomic productivity should no longer be kept in flocks and herds. This applies to all classes of livestock. Drastic culling must be practised. This is the duty of the owner of the animals who knows their history and their records. But, in addition, there should be retained throughout the country only animals in a good state of health. We have means at our disposal for the diagnosis of many of the diseases which exist in our livestock. In many cases by their application it is possible to diagnose the presence of latent infections, which not only materially interfere with the health of the individual animal but also endanger the health of large numbers of immediate contacts.

Long ago, much fuller use should have been made of the veterinary profession with the object of ascertaining the state of health of all the various classes of livestock throughout the country. It is now imperative that the infected animal should be recognised and removed from the flocks and herds so that not only will the health of the remainder be protected but the animals will be productive to the greatest extent and the available foodstuffs will be used to the fullest advantage. We understand the "Survey" Committee of the National Veterinary Medical Association intends to give its full and immediate attention to this matter so that the veterinary profession can be used fully to the ultimate benefit of the whole country.

* * * * *

THE USE OF SULPHONAMIDE COMPOUNDS IN VETERINARY PRACTICE

BEARING in mind the lag which often occurs between the discovery of a new therapeutic compound or method and its application on a large scale, it is encouraging to look back on the last five years and realise the strides which have been made in the chemotherapeutic field since Domagk reported his original findings in 1935. Within a year or so, his results in mice were shown to be paralleled by those obtained in human infections with Group A haemolytic streptococci and since then we have witnessed an ever-increasing activity on the part of chemists, bacteriologists and clinicians (medical and veterinary) in the synthesis, laboratory testing and application respectively of various members of the sulphonamide or allied groups. Numerous new compounds have been produced and many already have been tested. Some have proved of very much higher activity than sulphanilamide or its forerunner, prontosil, but too toxic for practical use; others such as, for example, sulphapyridine, are already of proved value.

With the examination of compounds containing diverse chemical groupings is coming a knowledge of the groupings essential for therapeutic success and some light is dawning on the way in which they act. We may hope for ever greater advances in the near future.

To turn to the more purely veterinary aspect as represented at the recent discussion of the Central Veterinary Society, it is gratifying to see the extent to which our knowledge of the range of usefulness and limitations of some of those compounds has developed. It still remains true (as stated in these columns earlier) that sulphanilamide itself appears able to do nearly all, if not all, that the newer compounds can do as far as our patients are concerned. It has, of course, the additional advantage of being relatively cheap. The view expressed earlier that its greater value was in the treatment of the more acute conditions associated with streptococci, and especially those of equines, also remains true, though more recent data confirm its value in chronic bovine mastitis and certain acute infections in other animals. Dosage, however, must be adequate.

It would be difficult to over-estimate the value of the contribution made by Mr. King, a practising veterinary surgeon, with a unique knowledge of equine diseases, in his pioneer investigations upon the application of sulphanilamide treatment in horse practice. Mr. King himself has made generous reference to the help given him by certain laboratory workers. It is our view that by such co-operation between clinician and laboratory worker, fully documented records upon a sufficiently large number of cases to furnish permanently valuable data can be obtained more satisfactorily than in any other way. It is essential that more facilities be made available for such co-operation.

A Ministry of Agriculture announcement states that any householder or allotment holder may, in future, keep pigs, hens or rabbits. An Order in Council suspends all restrictive covenants in tenancy agreements and in local by-laws. Houses for these classes of stock may be erected and any necessary work may now be done without reference to local authorities, landlords or amenity agreements. "At the same time the neighbours must be considered, also reasonable standards of cleanliness. No one will be allowed to create a nuisance or to cause prejudice to health, and the stock will be subject to the usual disease regulations. A point worth noting is that hens are specified, meaning that cockerels are not covered by the order."

* * * *

Lancashire Poultry Producers' War Emergency Committe is to ask the Government to consider the cold storage of fowls in bulk. By this means it is hoped to avert a drop in prices following the wholesale slaughter of stock expected to take place during the next three months. The Committee, at a recent meeting, expressed the opinion that the reduction of flocks by two-thirds would mean that approximately forty million head of stock would have to be slaughtered before the winter.

CLINICAL COMMUNICATIONS

Extra-Uterine Pregnancy in the Bitch Accompanied by Pyometritis

MADELINE SHEPPARD, M.R.C.V.S.
Bayswater

Subject.—A 12-year-old multiparous Cairn Terrier weighing 12 lb.

History.—The bitch's third pregnancy occurred seven years ago and at full term she gave birth to one live puppy. Two other foetuses were palpated per abdomen and ergot was administered without results. The animal showed symptoms of malaise, but recovered in a few days. Radiograph (1) [Fig. 1] revealed the presence of two foetuses and it was concluded that they were extra-uterine.

Since that time the bitch has been normal. Oestrum has occurred twice yearly and six weeks prior to examination accidental mating took place and the owner believed her to be pregnant.

Symptoms—Examination.—Illness was of seven days' duration, the bitch lost bodily condition, showed inappetence, excessive thirst and occasional vomiting. Abdominal distension became noticeable and there was an intermittent purulent vaginal discharge. On examination the temperature was 104°, and the distended uterus was palpated.

Diagnosis.—Pyometritis.

Treatment.—Metrectomy was performed. Surgical anaesthesia was induced by the slow intravenous injection of 2·75 grains of Nembutal.

An incision 2·5 inches long was made through the tissues of the right flank, parallel to the spine and 2 inches above the mammary glands. The uterus and left ovary were found to be free of adhesions, while the right ovary and Fallopian tube were closely adherent to the head of one foetus. This head was also adherent to the abdominal wall. Complete reabsorption of the soft tissues had taken place and the bony mass was surrounded by omental adhesions.

No attempt was made to remove the abdominal foetuses or to explore further, as it was concluded that both foetuses were adherent to much of the viscera, and that interference would result in death from haemorrhage or from surgical shock. The left ovary and the uterus were removed by the technique described by Wright, J. G.[1], while the right ovary was left *in situ*, incision being made at the junction of the cornu and the Fallopian tube.

The abdominal wound was closed by two layers of interrupted sutures, using No. 3 catgut for muscles and peritoneum, and No. 3 silk for the skin.

Recovery was uneventful, the wound healing by first intention, and the skin sutures were removed on the fifth day.

Remarks.—Extra-uterine pregnancy appears to be a rare condition in the bitch.

Williams, W. L.,[2] Cornell, divides the condition into two classes: (*a*) true extra-uterine pregnancy, where the fertilised ovum acquires nutritive relations with tissues other than the endometrium and undergoes embryological development; (*b*) secondary extra-uterine pregnancy where the foetus develops within the uterine cavity, and at a later stage is liberated by a rupture of the uterine wall, perishing without further growth.

It is to this latter class that the present case appears to belong, since the radiographs clearly show that the foetuses are fully developed, and such development could only have taken place within the uterus. They became extra-uterine at parturition.

The sequence of events would therefore seem to have been as follows:—

During pregnancy seven years ago, one foetus developed in the left uterine cornu, and during parturition was expelled normally. Two foetuses developed in the right cornu, but due to a torsion—which later corrected itself—were imprisoned in the cornu and later liberated into the abdominal cavity by rupture of the uterine wall. Haemorrhage was checked by rapid uterine involution.

Keller states that ruptures of the uterus can heal virtually without a scar. This fact has been observed by the present writer when performing Caesarian section for the second time on a bitch, when the original incision could not be recognised. Thus the absence of lesions on the uterine wall is without significance in the case under discussion.

The foetuses became sterile foreign bodies in the abdominal cavity and were eventually surrounded by omental adhesions while at the same time reabsorption of soft tissues took place. The radiographs demonstrate the progressive compression of the foetal skeletons.

Tubal pregnancy—a form of extra-uterine pregnancy—is well recognised in human obstetrics, usually terminating in abortion or in tubal rupture, with a resultant haemorrhage that proves fatal unless surgically controlled. In the bitch, the Fallopian tube would rupture at about the twentieth day, and the liberated foetus would perish at the blastocyst stage.

In the case under discussion the possibility of tubal pregnancy can be ignored, since at no time during the period of pregnancy did the bitch show any symptoms of internal haemorrhage, and the foetuses are obviously fully developed.

References

[1]Wright, J. G. *Vet. Rec.* (1939.) **51**. 1336-9.
[2]Williams, W. L. "Veterinary Obstetrics."
[3]Wright, J. G. Private communication.

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Osteo-Sarcoma of Humerus with Symptoms of Radial Paralysis

J. ADAMSON, Jun., M.R.C.V.S.
Bolton

Subject.—Airedale male, eight years old, in good bodily condition.

History.—The animal had been showing symptoms of lameness for about 14 days when it was brought to the surgery for examination on March 7th.

Symptoms.—The symptoms shown were those of radial paralysis with a typical low carriage of the elbow and inability to maintain the limb in an extended position when weight was put on it. There was, however, a certain amount of tenderness when pressure was applied to the caput muscles, but no enlargement or abnormality of the bone was evident. There was no history of any trauma or accident, but the dog was said to have a habit of jumping up at a high garden fence, and it was thought that an awkward landing might have caused over-abduction of the fore limb with stretching of the musculo-spiral nerve.

Diagnosis.—Radial paralysis of unknown origin. A

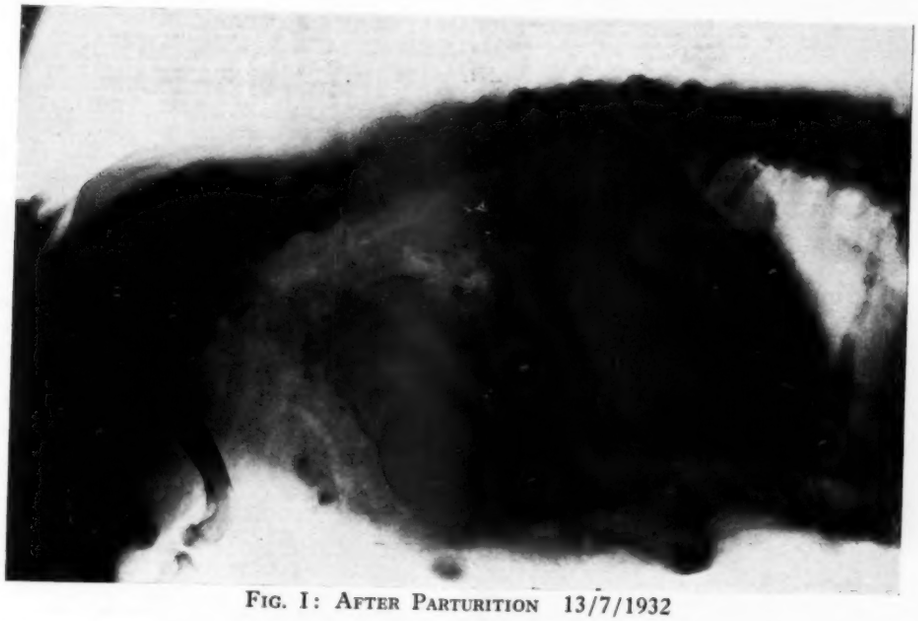

FIG. I: AFTER PARTURITION 13/7/1932

FIG. II: INTERMEDIATE 22/10/1938

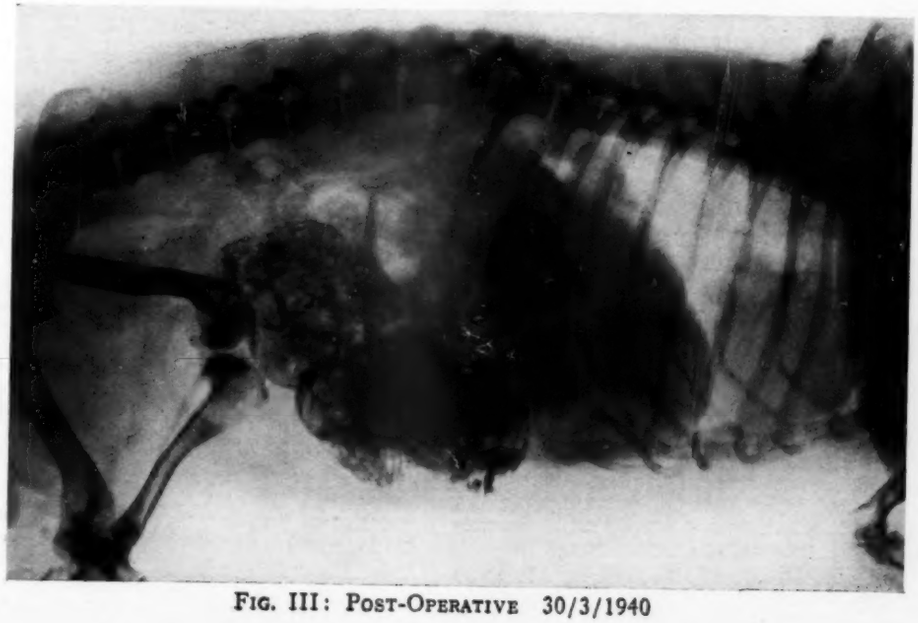

FIG. III: POST-OPERATIVE 30/3/1940

J. ADAMSON: OSTEO-SARCOMA OF HUMERUS

favourable prognosis was given and treatment consisted of rest and massage. No improvement was noticeable by March 15th, and there was some muscular atrophy. Radiant heat and massage were applied every other day, with restricted exercise. March 21st: there was considerable improvement in the lameness and the dog had developed a large interdigital cyst on the right hind foot. April 3rd: dog much worse again. Muscular atrophy very pronounced and an enlargement of the shaft of the humerus, which was about the thickness of a hen's egg, could be easily seen and felt. The diagnosis now made was sarcoma of the shaft of the humerus, and destruction advised.

The owner desired a radiograph as confirmation of the clinical diagnosis and the accompanying plate clearly shows the bone expansion. The dog was destroyed on May 1st, and the following is the report of Dr. G. O. Davies who carried out a pathological examination :—

"Dissection of the tissues of the left fore-leg of the eight-year-old Airedale revealed the presence of a tumour in the shaft of the humerus involving the whole circumference of the bone. The overlying muscles and nerves were not directly involved. The tumour itself was very vascular and much of its substance had broken down forming a kind of false cyst. Histological examination revealed it to be an osteoclastoma (myeloid sarcoma)."

Remarks.—The case is recorded chiefly because no evidence of a bone tumour was noticeable until lameness had been in existence for six weeks.

The symptoms of radial paralysis are difficult to account for as dissection shows that there was no direct involvement of the musculo-spiral nerve.

* * * * *

Sulphapyridine in Human Anthrax*

Wm. BONNAR, M.B.

House Physician, Royal Victoria Hospital, Belfast

A cow belonging to a farmer near Carrickfergus, Co. Antrim, died on November 11th, 1939. Assisted by his farm labourer and a butcher-boy, he proceeded to open the animal and take the hide off it. The butcher-boy noticed that the spleen of the cow was enlarged and suspected anthrax. A veterinary surgeon was then called out, and he took away the spleen and demonstrated anthrax bacilli in it.

Case I

Ten days later the farm labourer went to his doctor complaining of a sore on his right hand. The doctor suspected anthrax, and sent the patient to the Royal Victoria Hospital, Belfast. The patient's history was that the trouble started with a pimple about five days before; he had scratched the top of it, then applied poultices, but it got larger, and he now had some pain in the axilla. The lesion was slightly itchy but not painful. It was situated at the base of the metacarpal bone of the right thumb, was about three-quarters of an inch in diameter, and consisted of a central black eschar surrounded by a raised partly vesicular margin and then a wide area of congeston and oedema. Several enlarged and tender glands were present in the right axilla. His temperature was 101·2° and pulse 120. A film made from the serum showed anthrax bacilli.

The treatment on admission was 70 c.cm. of Sclavo's serum intravenously, together with 0·6 gramme of N.A.B. Next day he appeared no better, and was given 40 c.cm. of serum and 0·6 gramme of N.A.B. By the evening he had not improved, so he was started on sulphapyridine 1 gramme (two tablets) four-hourly, and the serum and N.A.B. were stopped. The result of the sulphapyridine was to cause a drop in the temperature from 102·5° to 99° in twelve hours and in the pulse rate from 110 to 90. The patient felt a little better, and next day the local lesion ceased to spread and soon became less inflamed. The temperature never rose again. The patient had altogether 15 grammes of sulphapyridine. Before the drug was stopped he became somewhat cyanotic, but showed no other toxic signs.

Case II

The butcher-boy, aged 17, was admitted late the same night. He presented a typical pustule on the left forearm; his temperature was 101° F. He was given 50 c.cm. of serum intravenously and 0·6 gramme of N.A.B., and next day 40 c.cm. of serum and 0·6 gramme of N.A.B. It was at first intended to give him no sulphapyridine and to use him as a control for the other case, but as he appeared to be getting worse next morning it was decided to administer sulphapyridine. He had 2 grammes at the start, followed by 1 gramme four-hourly. His temperature was lower after four hours, and in twelve hours was down almost to normal. He continued to improve generally and locally, and showed no toxic symptoms.

Discussion

The results in these two cases appear so striking that one feels certain that sulphapyridine must have been responsible. The results are open to criticism since serum and an arsenical preparation were used as well, but it was not thought justifiable to drop existing forms of treatment. In view of the fact that anthrax is not very common in this country I think there is little hope of ever getting enough cases to divide into "treated" and "control" groups that would satisfy the statisticians. For this reason I think the cases worth reporting, since an accumulation of such cases would appear to be the only way we can get an answer to the human problem of the effectiveness of sulphapyridine in anthrax.

Cruikshank (1939) established that the life of mice infected with anthrax could be prolonged by moderate doses of sulphapyridine and about one-third of the infected mice could be saved by larger doses, whereas all the mice which did not receive the drug died. More extensive clinical trial will probably establish that sulphapyridine is the most potent remedy for human anthrax.

I wish to thank Dr. J. C. Rankin, under whose supervision the treatment was carried out.

Reference

Cruickshank, J. C. (1939.) *Lancet.* **2.** 681.

*Reproduced from the *British Medical Journal*, March 9th, 1940.

Beet Top Silage for Sows.—Some interesting results have recently been obtained from feeding beet top silage to breeding sows. The object was to manage with less meal, so meal was limited to 2 lb. per day, supplemented by fresh tops or silage. When the fresh tops were no longer available, 56 lb. of silage per day was fed to four sows. For a fortnight the meal ration was raised to 3 lb. per sow per day, and then, for the last three to four weeks before farrowing, to 4 lb. per day. The silage was correspondingly reduced to 40, then 32 lb.

After farrowing the sows were allowed 1 lb. of meal for each pig suckled, but only to a limit of 8 lb. in all. From about the fourth day of farrowing, 4 lb. of beet top silage a day was allowed. Useful grazing has been obtained with the better weather.

ABSTRACT

[TREATMENT WITH SULPHANILAMIDE OF MENINGO-ENCEPHALITIS ASSOCIATED WITH CANINE DISTEMPER. Morris, M. L., and Murray, T. J. (1940.) *J. Amer. vet. med. Ass.* **96**. 80-86. (3 tabs., 12 refs.).]

The writers state that meningo-encephalitis associated with canine distemper had been considered for years as an incurable disease, the mortality being said to be from 90 to 100 per cent. Canine distemper, they say, is an acute febrile, infectious disease caused by the filtrable virus of Carré. It is extremely devitalising, since it has an affinity for the haemopoietic tissue. Infected dogs treated during the initial temperature rise (one to three days) with copious doses of hyper-immunised homologous serum usually respond satisfactorily. This early phase of the disease has passed, however, in the majority of dogs presented for treatment; the animal is entering the phase of secondary complications before it is possible to administer the specific serum treatment. In most instances, therefore, the veterinarian is forced to cope with the disease in its complicated form.

Meningo-encephalitis, commonly called nervous distemper, is a nervous syndrome following in the wake of canine distemper. The prognosis is usually unfavourable. Occasionally a dog may live, but chorea, blindness, deafness, partial paralysis of the limbs, or other unsatisfactory sequelae are present. The specific aetiological agent of meningo-encephalitis is unknown. There are some who consider that it is a virus distinct from that of distemper; others that it is a diplococcus or a streptococcus. The writers have been unable to cultivate any microorganism under aerobic or anaerobic conditions from the brain and spinal fluid of dogs infected with meningo-encephalitis, but have done so from the spleen and liver. It is their belief that the canine distemper virus destroys the animal's protective mechanism sufficiently to permit an associated virus to attack the nervous system.

Since early in 1938 they have been treating meningo-encephalitis associated with canine distemper with sulphanilamide, the treatment being commenced as soon as the earliest nervous manifestations occurred. The dose of the drug must be varied, and should be administered by the mouth or subcutaneously so that the blood-sulphanilamide level is maintained at not less than 15 mg. per cent. Tables are given of the blood pictures of normal dogs and dogs suffering from meningo-encephalitis before and after sulphanilamide therapy. Thirty animals have been so treated, with an estimated recovery of 93 per cent. In the blood of all infected dogs there was an increase in the percentage of segmented polymorphonuclear neutrophiles and a decrease in the percentage of lymphocytes. With sulphanilamide therapy, the blood picture approaches normal as the disease is brought under control. Appropriate treatment of complications is necessary, saline and dextrose with thiamin chloride in copious quantities being recommended.

L. E. W. B.

A control order has been made limiting the production of compound and mixed feeding stuffs, to ensure that livestock producers can obtain their pre-war proportion of "straight" feeding stuffs.

SULPHANILAMIDE IN THE LOCAL TREATMENT OF WOUNDS

"The local application of sulphanilamide in infected or potentially infected wounds has not been encouraged," points out the *Lancet* in a recent annotation, adding that these compounds are not true antiseptics. They show bactericidal effects on the haemolytic streptococcus *in vitro* only when the organisms are scanty. There seems, however, to be no general agreement about the way in which they act in the body. Evidence has been brought forward by Wolff and Julius* that sulphanilamide acts on organisms only when they are actively multiplying. This would explain why it is more effective in acute infections than in chronic. If this suggestion is correct there is no logical reason why the compound should not be used locally. Excellent results have in fact been claimed by Jensen, Johnsrud and Nelson† in the treatment of potentially infected compound fractures and dislocations by local implantation of crystalline sulphanilamide. In 39 cases careful débridement, haemostasis and closure of the wounds combined with complete reduction and immobilisation of the limb were supplemented by the insertion of 5 to 15 g. of solid sulphanilamide. Only two cases developed subsequent infection and in both of these the fractures had become recompounded owing to mismanagement. A series of 94 open fractures treated without sulphanilamide showed subsequent infection in 27 per cent.; seven of these developed gas gangrene and in five amputation had to be performed to control the infection. Jensen and his colleagues also present some experimental support for this line of treatment. They fractured certain ribs in guinea-pigs and contaminated the wounds with cultures of *Staphylococcus aureus haemolyticus*. The majority of animals in which solid sulphanilamide was implanted in the wound before closure survived without developing infection. When the sulphanilamide was omitted the majority developed suppurative osteomyelitis. In a further group it was shown that insertion of sulphanilamide into the tissues at a point remote from the infected site did not exercise any appreciable protective effect on the animal. With this local treatment, a higher concentration of the drug is maintained at the focus of infection than can be achieved by systemic administration. It is slowly absorbed, and as was demonstrated in two of Jensen's patients the maximum concentration in the blood-stream is reached after about 18 hours while a period of 60 hours is required for its complete disappearance. The question will naturally be raised whether so massive a local concentration of sulphanilamide is damaging to the tissues, and this should be investigated. Meantime it is encouraging to note that Wolff and Julius found that cultures of chick fibroblasts would grow as actively as control cultures in concentrations of sulphanilamide as high as 0·1 per cent."

*Wolff, L. K., and Julius, H. W., *Ann. Inst. Pasteur*, 1939, **62**, 616.

†Jensen, N. K., Johnsrud, L. W., and Nelson, M. C., *Surgery*, 1939, **6**, 1.

* * * * *

All-grass feeding of dairy herds to-day is not only prudent farming, but is also common sense: grass is still nature's greatest cattle food in this country. . . . The days of high milk records have gone for the time being. So has the demand for quality beef, or high-grade bacon. What the nation wants to-day is just as much meat and bacon as the farmers of the country can produce—and produce quickly. High grading is of no account. Quantity is vital. Hidebound or standardised methods of feeding must go by the board. The farmer must be thankful to feed whatever he can obtain.—*Farmers' Weekly.*

* * * * *

Hill farmers in the South-West of Scotland have passed through the second year of more than average heavy loss among their flocks. Louping-ill has taken a heavy toll of ewes and hoggs, and there has also been a large percentage of deaths among the lambs.—*Farming News.*

Food for Sick Animals

N.V.M.A. Negotiations with the Ministry of Food

At the April meeting of the Council of the National Veterinary Medical Association, the President (Mr. H. W. Steele-Bodger) gave an undertaking that, as requested by a Divisional Resolution, the Association would approach the Ministry of Food with a recommendation that all Cattle Food Stores and Co-operative Societies shall reserve a supply of foods suitable for sick animals, such supplies only to be given out on a veterinary surgeon's Certificate.

Expert advice on such foodstuff supplies having been secured (within the profession) a letter was sent to the Ministry of Food suggesting that in addition to the County reserve stocks of animal foodstuffs held under the control of the County War Executive Committees, there should be included the following :—

10	tons	Bran.	2	tons	Whole Linseed.
3–5	„	Middlings.	2	„	„ Oats.
3–5	„	Flaked Maize.	10	„	Treacle.

It was suggested to the Ministry that it should be made possible for these emergency rations to be drawn at current prices, on production of a veterinary surgeon's certificate, and that arrangements should be made to enable owners of animals to draw them through local dealers.

At the same time the Association approached the National Farmers' Union and asked them to support these requests.

In reply, the Ministry's Animal Feeding Stuffs Division said that it was difficult to increase the number of articles of foodstuffs in the county reserve ; the Chairman of the Feeding Stuffs Committee in each county was in constant contact with the traders in this area, and the Ministry considered there should be no difficulty in obtaining the comparatively small quantities of any particular feeding stuffs that may be required in an emergency, were the County Chairman advised of the circumstances.

The Association replied to this letter expressing disappointment with the Ministry's attitude. An assurance was asked for that, even if there were difficulties in making available an adequate supply of the foods suggested by the Association, some precise directions would be given to the Chairman of the Feeding Stuffs Committee in each county emphasising the importance of ensuring a supply of suitable foods to be held in reserve. It was pointed out that the mechanism suggested was too cumbersome to be effective ; that when special foods are required for sick animals they are needed immediately and that the advantages of preventing loss more than warranted the expenditure of the time and trouble involved in organising some suitable scheme.

In reply to this letter the Ministry said that the suggestion made in their previous letter was put forward as a method likely to result in the more rapid delivery of foods suitable for sick animals than could be given were the commodities mentioned by the Association included in the County Emergency Reserves. Were the suggested procedure adopted the Chairman of the County Feeding Stuffs Committee would probably be able to arrange by telephone with a trader in his area to supply what was needed. The letter concluded with the statement that a release from the county involved consultation with the War Agricultural Executive Committee.

The reply from the National Farmers' Union stated that the Commercial Committee of the Union could not see their way to adopt the Association's suggestion in its entirety, but had decided to suggest that a veterinary surgeon's certificate should constitute a priority order on existing county reserve stocks of feeding stuffs.

A list has been supplied by the Ministry of the names and addresses of the Chairmen of the County Feeding Stuffs Committee. This was asked for by the Association with a view to making this information readily available to the members of the profession when the Ministry had given a final decision. The list is as follows :—

Animal Feeding Stuffs Distribution

REGIONAL FEEDING-STUFFS ALLOCATION COMMITTEES

County Representatives

Hull Port Area

Division.	County.	County Chairman.
1. Northern ... N.	Durham	F. C. Johnson, Teesside Farmers, Ltd., 13, Horsemarket, Darlington. Darlington 2103.
	Northumberland	Robert Shield, W. A. Temperley & Co., Ltd., 2, St. Nicholas Buildings, Newcastle-on-Tyne, 1. Newcastle 21166 (2 lines).
	Yorkshire—N. Riding	E. Bedford, Yorkshire Farmers, Ltd., 51, Skeldergate, York. York 2021/2/3.
2. North Eastern ... N.E.	Yorkshire — W. Riding, York City and County	J. R. Page, The Mill, Tadcaster. Tadcaster 29.
	Yorkshire—E. Riding	George Westerdale, R. J. Hosdell & Co., 5, New Walk, Beverley. Beverley 25.
3. North Midland... N.M.	Derbyshire (except the part allocated to Region 13)	H. Sears, W. & S. Burkitt, Ltd., 14, Saltergate, Chesterfield. Chesterfield 2876.
	Lincolnshire (Holland)... ...	G. F. Birch (G. F. Birch & Son, Ltd.), High Street, Spalding. Spalding 111/112.
	Lincolnshire (Kesteven) ...	Frank Money (R. W. & F. Money), Sleaford. Sleaford 85.
	Lincolnshire (Lindsey)... ...	G. Harrison (T. Harrison & Sons), Corn Exchange Buildings, Horncastle. Horncastle 44.
	Leicestershire and Rutland ...	R. J. Rawlings, 16, St. Nicholas Street, Leicester. Leicester 22254.
	Northants	Hugh Latimer (Latimer & Crick), 21, Horsemarket, St. James Mills, Northampton. Northampton 122.
	Nottingham	Rastall, E., North Notts Farmers, Bridge Place, Worksop. Worksop 2208/9.

Division.	County.	County Chairman.
	HULL PORT AREA—(*contd.*).	
3. North Midland... N.M.	Soke of Peterborough	J. S. Slater, c/o Slater & Sons, Cowgate, Peterborough. All communications to be sent to Hon. Sec., W. A. George, c/o Messrs. Cadge & Colman, Roller Flour Mills, Peterborough.
	In addition the following parts of Huntingdonshire— Urban District of Fletton, Rural District of Norman Cross and the following from the Isle of Ely— Urban District of Whittlesey, Rural District of Thomery. (These districts will be attached to the Soke of Peterborough.)	
	LONDON PORT AREA	
4. Eastern ... ... E.	Bedfordshire	Capt. W. C. Knight, 41, Lansdowne Road, Bedford.
	Cambridgeshire	G. S. Wilkinson (Samuel Wilkerson & Son, Ltd.), Royston, Herts. Royston 2219.
	Huntingdonshire (except the part allocated to Region 3)	Alfred Golding, Corn & Seed Merchant, St. Ives, Hunts. St. Ives 49.
	Suffolk (East)	G. B. Cubitt (Cubitt & Sons), Prudential Buildings, Ipswich. Ipswich 3471.
	Suffolk (West)	Cady Byford (C. W. Byford & Sons), Clare, Sudbury, Suffolk. Clare 53.
	Norfolk	J. Brewster (Case & Steward, Ltd.), Southwell Road, Norwich. Norwich 354.
	Isle of Ely (except the part allocated to Region 3)	H. T. Setchell, The Green, Haddenham, Ely, Cambs. Haddenham 7. Sutton 13.
5. Eastern II ... H.C.N.	Essex (less London Metropolitan Area)	Major D. C. Hasler (Hasler & Co., Ltd.), Dunmow. Great Dunmow No. 7.
	Herts (less London Metropolitan Area)	G. W. Dixon (E. Dixon & Sons (Ware) Ltd.), Crane Mead Mills. Ware 250.
6. London ... ... L.	Metropolitan Area (including Middlesex)	C. W. Higgs (Pattullo, Higgs & Co., Ltd.), Orpington, Kent. Orpington 988.
7. South Eastern ... H.C.S.	Kent (less London Metropolitan Area)	E. E. Elgar (F. Elgar & Son, Ltd.), West Street Wharf, Faversham. Faversham 303/4.
	Sussex (East)	Arthur Strickland, 1, The Uplands, Lower Maze Hill, St. Leonards-on-Sea. Hailsham 200.
	Sussex (West)	Kenneth A. Higgs (Jenner & Higgs), Bridgers Mill, Haywards Heath. Haywards Heath 477.
8. Southern ... S.	Buckinghamshire	G. E. Stevens (G. E. Stevens (High Wycombe) Ltd.), 22, Church Street, High Wycombe. High Wycombe 782/3.
	Hampshire	F. J. Smith (Smith Bros. (Basingstoke) Ltd.), Bunnian Place, Basingstoke. Basingstoke 10.
	Isle of Wight	Leigh Thomas (Leigh Thomas & Co., Ltd.), Newport, Isle of Wight. Newport 518/519.
	Surrey (less London Metropolitan Area)	Major A. W. Bowyer, O.B.E. (H. & A. Trower), Earlswood, Redhill. Redhill 655/6.
	Berkshire	E. C. Midwinter (Chas. Midwinter & Son, Ltd.), 7, Cheap Street, Newbury. Newbury 812.
	Oxfordshire	J. C. M. Stokes (Goodenoughs, Ltd.), Station Hill, Reading, Berks. Reading 4287/8.
	In addition the following from Dorset— Borough of Poole. Urban District of Winborne Minster. Rural Districts of Wimborne and Cranborne. (These districts will be attached to the County of Hampshire.) Channel Isles also to be attached to Hampshire.	
	BRISTOL PORT AREA	
9. South-Western ... S.W.	Dorset (except the part allocated to Region 8)	A. H. Hunt (Christophere Hill, Ltd.), The Quay, Poole. Poole 638/639.
	Gloucestershire	Guy R. G. Tombs (T. Robinson & Co. (Gloucester) Ltd.), Gloucester. Gloucester 2134.
	Somersetshire	J. Stuart Jones (Jones & Son (Bruton) Ltd.), Tolbury Mills, Bruton, Somerset. Bruton 12.
	Devonshire	J. G. H. Halse (of J. W. Halse), Sidmouth. Sidmouth 500.
	Cornwall	T. P. Fulford, Penquite, Launceston. Launceston 200.
	Wiltshire	S. Sainsbury (H. R. & S. Sainsbury, Ltd.), Trowbridge, Wiltshire. Trowbridge 232.
10. South Wales ... S.Wa.	Glamorganshire	R. Griffin, Melincorwg, Upper Boat, Pontypridd, Cardiff. Cardiff 640 & 6143.

Division.	County.	County Chairman.
	BRISTOL PORT AREA (*contd.*)	
10. South Wales ... S.Wa.	Monmouthshire	T. Williams (Newcombe Bros.), Tredegar Street, Newport, Mon.
	Brecknockshire	J. S. Davies, Liverpool House, Builth Wells, Brecknock. Builth Wells 309.
	Radnorshire	D. Sibbald (Radnorshire Coal, Lime and General Supply Co., Ltd.), Knighton, Radnorshire. Knighton 7.
	Cardiganshire	D. J. Evans (D. H. & T. Evans & Sons), The Stores, Pontshaen, Nr. Llandyssul. Pontshaen No. 1.
	Pembrokeshire	T. R. Morgan (W. R. Morgan & Son), Carew Mills, Pembroke. Pembroke 233.
	Carmarthenshire	A. E. Maddock, Western Counties Agriculture Co-operative Association, Ltd., Towy Mills, Carmarthen. Carmarthen 632
	LIVERPOOL PORT AREA	
11. Midland... ... M.	Warwickshire	G. W. Sale (Sale & Son, Ltd.), Atherstone. Atherstone 2272/3.
	Worcestershire	R. E. Ratcliffe (R. E. Ratcliffe, Ltd.), 59, Foregate Street, Worcester. Worcester 3311. Late Phone 754.
	Staffordshire	F. R. Durose (Alrewas Mills, Ltd.), Alrewas, Burton-on-Trent. Alrewas 271.
	Herefordshire	A. H. Griffith (A. T. Turner & Co.), Hop Market, Broad Street, Hereford. Hereford 3076.
	Shropshire	F. Davies, South Shropshire Farmers, Farmore Mills, Craven Arms. Craven Arms, 91/2.
12. North Wales ... N.Wa.	Anglesey	W. Oswald Thomas, Bridge Street, Llanerchymedd, Anglesey. Llanerchymedd 16.
	Caernarvonshire...	W. S. Lloyd, Ardol, Pwllheli, Caernarvonshire. Pwllheli 96.
	Denbighshire	Evan Roberts, Ddol, Llansannan, Denbighshire. Llansannan 6.
	Merionethshire	Appointment being considered.
	Flintshire	D. C. Williams, Vale of Clwyd Farmers, Ltd., Station Yard, St. Asaph, North Wales. St. Asaph 27.
	Montgomeryshire	Mr. C. James, Brnawel, Montgomery. Montgomery No. 9.
13. North West ... N.W.	Cumberland	Wm. Pattinson (John Pattinson & Son) Beacon Mills, Whitehaven. Whitehaven 420.
	Westmorland	Alderman R. J. Dawson, Brampton Crofts, Appleby, Westmorland. Appleby No. 5.
	Cheshire	L. Huntbach, Chester & District Farmers, Cow Lane Bridge, Chester. Chester 2876/7.
	Lancashire	J. Simpson (Henry Shutt, Ltd.), Blackburn. Blackburn 7191/2.
	In addition the following from Derbyshire— Boroughs of Glossop and Buxton Urban Districts of New Mills and Whaley Bridge Rural Districts of Chapel-en-le-Frith. (These districts will be attached to the County of Cheshire.) Isle of Man will be attached to Lancashire.	
	LEITH PORT AREA.	
S.1. South East ... S.E.	Berwick and Roxburgh ...	W. R. McCreath (H. G. McCreath & Sons), Berwick-on-Tweed. Berwick 426.
	East Lothian, Midlothian and City of Edinburgh	John Allan (J. & A. Wyllie, Ltd.), 2, West Bowling Green Street, Leith. Leith 35132.
	West Lothian, Peebles and Selkirk	Alex Waugh (J. & A. Waugh), 16, Torphichen Street, Edinburgh, 3. Edinburgh 24081/2.
S.3. East ... ... E.	Angus and the City of Dundee...	James Grant, (John Grant & Sons, Ltd.), 7, Crighton Street, Dundee. Dundee 5026.
	Fife and Kinross	Thomas Cunningham (John G. Cunningham, Ltd.), Lothian Street, Burntisland, Fife. Burntisland 2112/3.
	Perth	W. Lindsay Gillies (Messrs. J. McDonald & Sons), City Mills, Perth. Perth 1041/2.
S.E. 4. North-East... N.E.	Aberdeen and City of Aberdeen	C. J. Brown (C. J. Brown, Ltd.), 42, Regent Quay, Aberdeen. Aberdeen 1141. (After 7 p.m. 4146.)
	Kincardine	Dr. Frank G. Milne (John Milne & Sons, Ltd.), Southesk Granaries, Montrose, Angus. Montrose No. 16.
	Banff	J. C. H. Addison (Wm. Robertson & Co.), Gordons Granaries, Banff. Banff No. 10.
	Elgin of Moray, Nairn	W. H. Burr (The Banff & Moray Agricultural Co., Ltd.), 100, High Street, Elgin. Elgin 2239.
	Orkney	A. Ross (Aberdeen Lime Co., Ltd.), 30, Waterloo Quay, Aberdeen. Aberdeen 7878.
	Shetland	A. S. Seggie (Seggie & Co.), 17, Union Terrace, Aberdeen. Aberdeen 7600 (4 lines).

Division.	County.	County Chairman.
	Glasgow Port Area.	
S.2. West W.	Clackmannan and Stirling ...	A. Dewar (Jos. Gartshore & Sons), 7, Maxwell Place, Stirling. Stirling 469.
	Lanark	G. E. MacGregor (James MacGregor, Ltd.), Garrion Grain Mills, Wishaw, Scotland. Larkhall 184/5.
	City of Glasgow and Renfrew ...	John Kent (J. & J. Kent, Ltd.), 1,394, Gallowgate, Glasgow. Bridgeton 1651/2.
	Argyll, Bute and Dumbarton ...	David Cullen (John Cullen & Sons, Ltd.), 35, Cubie Street, Glasgow. Bridgeton 2547.
	Ayr	R. B. Sweet (of Messrs. Robert Howie), 21, Hope Street, Glasgow. Central 9525/6.
	Dumfries	Mr. Austin (John Charlton & Sons, Ltd.), 43, Whitesands, Dumfries. Dumfries 44 & 948.
	Kirkcudbright and Wigtown ...	H. H. MacFadzean (c/o A. McLelland & Sons, Ltd.), Station Street, Stranraer. Stranraer 391/2.
	Inverness	G. Grant MacKenzie (J. Mackenzie & Co.), Academy Buildings, Inverness. Inverness 109 & 818.
	Ross and Cromarty	George Davidson (The Highland Agricultural Co., Ltd.), 10, Falcon Square, Inverness. Inverness 585/6.
	Sutherland and Caithness ...	D. G. Mowat (W. & A. Geddes, Ltd.), 47, High Street, Wick. Wick No. 7.

IN PARLIAMENT

The following are among the questions and answers recently recorded in the House of Commons:—

Milk Infection (Protection)

Mr. David Adams asked the Minister of Health whether he is aware that tubercle bacilli and other pathogenic organisms found in untreated, non-designated milk render it unsafe for human consumption; and what remedial measures does he propose?

The Minister of Health (Mr. Malcolm MacDonald): I am aware of the problems presented by the liability of milk to infection, and, recognising the value of pasteurisation as a protection against such risks, I am considering what action I can take to secure the best results from its use. The hon. Member will appreciate the practical difficulties, particularly those of securing further pasteurising plant, involved in present circumstances, but I can assure him that when conditions permit, I should not hesitate to seek any powers that might be necessary and capable of general application to secure the adequate protection of the public health.

Dr. Edith Summerskill: Does the right hon. Gentleman contemplate getting these powers so that they will coincide with the provision of free milk for the public?

Mr. MacDonald: I have indicated that the main difficulty is in getting additional plant in present circumstances.

Mr. David Adams asked the Parliamentary Secretary to the Ministry of Food whether he will state the quantity of non-designated milk supplied by the Milk Marketing Board as food during the last twelve months, and the approximate quantity of the same pasteurised before being marketed to the public?

The Parliamentary Secretary to the Ministry of Food (Mr. Boothby): While I feel that it is not in the national interest to give information relating to milk production in this country, I may tell the hon. Member that 45 per cent. of the milk produced during the last twelve months was designated milk. The amount of milk which is pasteurised varies very extensively from town to town and detailed figures are not available.

Mr. Adams: May I ask whether it is the intention of the Milk Marketing Board to have undesignated milk labelled?

No answer was given.

Animal Feeding Stuffs

Mr. Price asked the Minister of Agriculture whether, in view of the expected yield of the newly ploughed-up land providing feeding stuffs for livestock containing, in the main, carbohydrates, he will bear in mind the importance in the coming winter of securing for the farmer, as far as possible, cakes and meals of a high protein content, so as to afford thereby balanced rations for livestock?

Mr. R. S. Hudson: Yes, Sir. The need for the largest possible supply of high protein cakes and meals next winter is fully recognised.

Colonel Burton asked the Minister of Agriculture what steps have been taken to increase the feeding stuffs available by the introduction of grass- or other crop-drying processes?

Mr. R. S. Hudson: This matter received careful consideration in the early days of the war, when it was decided that the stage of development of the grass-drying process was not sufficiently advanced to justify the Government in giving priority to materials for the manufacture of grass-driers in competition with other agricultural machinery. Encouragement was, however, given to the continuance of existing grass-drying centres; the fuel supplies for those plants was safeguarded, and steps were taken in appropriate cases to avoid any encroachment, due to the ploughing-up campaign, on the pastures from which the grass supplies were drawn.

ITALY AND THE DRUG MARKET

"Examined from a pharmaceutical point of view it may be observed that the stoppage of exports to Great Britain from Italy is not a matter which will inflict hardship on our population, although it will add to the difficulties with which drug dealers have contended successfully ever since German troops marched into Poland," states the *Pharmaceutical Journal*, and continues: "The market for citrus oils will need some reorganisation and a few drugs the trade in which was dominated by Italy, *e.g.*, orris root, squill and manna, are likely to become scarcer. Most of the other items of materia medica which are bought from Italy can be purchased elsewhere, and generally speaking the new situation can be faced with equanimity. Interference with the commerce of Mediterranean countries which the new war involves is bound to affect the drug trade in some measure and we shall endeavour in our market report to keep our readers advised of all new developments in this respect."

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

June 27th.—R.C.V.S. Written Examinations begin.

June 28th.—Meeting of the Society of Veterinary Practitioners at York, 2.30 p.m.

July 1st.—N.V.M.A. Committees, Edinburgh.

July 2nd.—N.V.M.A. **Council** and Committees, Edinburgh.

July 3rd.—Provisional date for commencement of R.C.V.S. Oral and Practical Examinations.

July 8th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

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National A.R.P. Animals Committee

Those Veterinary Officers who have not notified headquarters of the details of the arrangements they have made should send in to headquarters full particulars of first aid posts, etc., in order that adequate press publicity may be arranged.

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Reports of Casualties

In further reference to the request for prompt notification of casualties caused by hostile aircraft made in our issue of June 1st, the Chief Executive Officer requests us to state that the reports of veterinary officers should include particulars of the type of animal, description, age and approximate value, and information as to whether it has been killed, salvaged or afforded treatment.

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Area Veterinary Controllers

In our issue of June 8th we announced that, in order to facilitate the prosecution of the Rural Areas Scheme in full co-operation with branches of the National Farmers' Union and the Ministry of Food's Local Representatives, certain counties were grouped together under the supervision of Area Veterinary Controllers.

To the list of Controllers then published we are now able to add the following: Mr. S. G. Abbott—for the South-Western District of Scotland including Argyllshire, Dumbartonshire, Stirlingshire, Renfrewshire, Lanarkshire, Dumfriesshire, Kirkcudbrightshire and Wigtownshire; Mr. W. J. Ironside—for the East Midlands, including Nottinghamshire, Derbyshire, Leicestershire and Northamptonshire.

The area covered by Mr. Lyle Stewart, for the North of England, is again adjusted to include Westmorland and Cumberland.

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Volunteers for Home Defence Battalions

Conference Findings on the Position of University Students

A conference was held on May 28th, 1940, at the offices of the University Grants Committee, to discuss the bearing of the War Office appeal upon university students. There were present the Chairman and Secretary of the University Grants Committee, the Chairman of the Committee of Vice-Chancellors and Principals, representatives of the War Office, Ministry of Labour and National Service and the Board of Education. It was agreed that in general:—

1. Medical, dental and veterinary students, together with students in categories which fall within the purview of the Technical Committees of Joint Recruiting Boards, can still render the best national service by continuing their studies.

2. All other students should feel entirely free to volunteer if they so desire.

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R.C.V.S. OBITUARY

Cotton, Samuel John, Coshla, Usk, Monmouthshire. Graduated Dublin, July 12th, 1916. Died June 19th, 1940.

Hogben, Thomas Frederic, Linden House, Ash, Canterbury, Kent. Graduated London, April 4th, 1877. Died June 14th, 1940, aged 84 years.

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PERSONAL

In connection with the anniversary of Sir Frederick Hobday's death, we are inserting the following from his brother, Captain Cecil Hobday:—

In Memoriam—Hobday.—In ever-loving memory of Sir Frederick T. G. Hobday, C.M.G., F.R.C.V.S., F.R.S.E., Past Principal and Dean of the Royal Veterinary College, London, who passed away on June 24th, 1939.

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GUARDING AGAINST SPOILAGE OF MEAT IN HOT WEATHER

Ministry of Food's Instructions to Slaughterhouse Agents

In a recently-issued Instruction (D.S. 2/19) to County or Sub-area Slaughterhouse Agents the Meat and Livestock Division of the Ministry of Food intimate that they have had the benefit of advice of officers of the Low Temperature Research Station of the Department of Scientific and Industrial Research in regard to measures to guard against spoilage of meat due to the advent of the warm and more humid weather. In forwarding to these Agents the summary of the recommendations made by this station (reproduced below) the Ministry ask that they shall be studied and borne in mind in considering the problem at each individual slaughterhouse. "It will be seen that the attainment of a high standard of hygiene inside the slaughterhouse is probably the most important factor in this matter—more important even than temperature control—and Area and County Slaughterhouse Agents should, therefore, do their utmost to see that the personnel in the slaughterhouses under their control at all times maintain a high standard of cleanliness."

Recommendations Made by the Low Temperature Research Station

1. Spoilage is due primarily to the growth of micro-organisms on the surface of the tissues; every effort should, therefore, be made to keep them away. Temperature control, though very important, is secondary to this since it merely retards the activities of micro-organisms.

2. The following general recommendations were made without particular reference to the meat and livestock scheme:—

(*a*) Cattle should be rested and watered, but not fed, at least 24 hours before slaughter. Fatigued cattle are apt to be more prone to bone-taint.

(*b*) Every effort should be made to reduce contamination of the tissues with micro-organisms at all stages of handling. This involves:—

(i) Disinfection of hides and hoofs by spraying with suitable solutions or even spraying with water alone. A pressure spray will remove about half the contamination from the hides.
(ii) Boiling knives and instruments, and washing cloths before use.
(iii) Fresh supplies of hot water and clean cloths for each carcase.
(iv) General attention to sanitary arrangements on the killing floor: thorough cleansing after each day's kill, immediate removal of all offal, voided faeces, etc.
(v) Killing and dressing to be as rapid as possible.

(*c*) After killing and dressing, the dressed carcases should be run at once into refrigerated hanging rooms to cool and set. (A temperature of about 32° F. will be suitable.)

(*d*) After distribution, the meat (kept in as large pieces as possible) should be put in the butcher's refrigerator and kept there until required for use, and not taken in and out for display purposes.

(*e*) If the above principles are carried into effect, beef can be kept in good condition unfrozen for from three to four weeks.

(*f*) Micro-organisms multiply with great rapidity at air and normal body temperatures, but many can also grow fairly well at 32° F. Accordingly temperature control alone will not avert spoilage in heavily infected meat.

(*g*) Lowering the humidity of the air (good air circulation to avoid pockets of high temperature and high humidity) helps to retard bacterial growth.

3. The following more detailed recommendations were made after an officer of the Low Temperature Research Station had inspected a number of small slaughterhouses being operated under the meat and livestock scheme:—

(*a*) Under no circumstances should any offal, manure or scraps of any kind be left on the killing floor, or in manure dumps adjacent to the killing floor at the end of a day's killing. The killing floor and manure receptacles, etc., should be thoroughly hosed and then soaked with suitable disinfectant at the end of each day.

(*b*) To ensure that water used for swabbing, rinsing hands and instruments is really clean, and wherever possible, used hot, metal, glazed earthenware (or similar non-absorbent material) containers so arranged that each can be completely drained right to the bottom every few minutes, are preferable to wooden water tubs.

(*c*) Men engaged in flaying should be encouraged to rinse their hands frequently in hot soapy water and taught to avoid wiping their hands over the hide and then over the tissues.

(*d*) All swabbing cloths should be collected and boiled at the end of the day, and instruments thoroughly cleansed in hot soapy water.

(*e*) Slaughtermen's aprons of the leather or rubber type should be thoroughly cleansed at least with hot water and soap at the end of every day.

(*f*) The floor should be thoroughly flushed with water after the slaughter of each animal so that blood, faeces, etc., do not accumulate.

(*g*) Skinning and gutting should, as far as practicable, be carried out with the carcase hoisted and not lying on the floor in blood, etc.

(*h*) Places where hides, etc., are subsequently spread out should be disinfected daily if adjacent to the killing floor.

(*i*) Very close watch should be kept on the cooling arrangements for sides or carcases.
(i) Wherever possible, arrangements should be made to hang the meat to cool and set in an airy, well-ventilated space away from the killing floor. Killing should be so spaced out that a minimum load of meat is hanging at any one time.
(ii) Wherever (i) is impossible, any boiler inside the slaughterhouse should be replaced by one outside the door, or in some other convenient site, since moist air is exceedingly prejudicial to rapid cooling.

(*j*) All meat should be cleared away from the slaughterhouse as soon as it is cooled and set.

(*k*) If all the above recommendations 3(*a*)—(*j*) are successfully put into operation, there will still remain a fairly heavy infection transferred from the hide, by contact, in skinning the animal. If it is found that the beef will not keep for the desired period with the above precautions, efforts should be made to reduce infection from the hides by spraying the cattle before entry to the killing floor with water or disinfectant.

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A supplementary Instruction (D.S. 2/20) states: "With reference Instruction D.S. 2/19 on the above subject, on reconsideration it is thought better that County and Sub-area Slaughterhouse Agents should not at this stage arrange for the use of disinfectants as a means of avoiding spoilage of meat in hot weather owing to the capacity of meat for absorbing the odour of disinfectant. The Ministry is advised that hot water, soap and soda, thoroughly applied, is probably adequate for the purposes in view and the recommendations contained in Instruction D.S. 2/19 should be modified accordingly.

"The question whether there is available a disinfectant suitable for use in the manner suggested in Instruction D.S. 2/19 is under investigation."

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[Publication of these Instructions in our columns follows upon the ready acceptance by the National Veterinary Medical Association, of the suggestion put forward by the Ministry of Food, arising out of a recent meeting between representatives of the Ministry and of the Association, that a useful purpose would be served if copies of appropriate Instructions issued by the Ministry to its Area Officers concerned with the hygienic production and distribution of meat were sent to the Association for such publicity amongst its members as it considered desirable. In intimating that arrangements are being made to forward in future copies of other appropriate Instructions, as they are issued, the Secretary to the Ministry observes: "I need hardly assure you that the Ministry would welcome the co-operation of all members of your Association engaged in meat inspection in giving effect to these Instructions in so far as they are able." The Association, in advising the Ministry that these and future appropriate Instructions would be brought to the notice of members of the veterinary profession through the medium of the Association's journal, has assured the Ministry of its desire to render any further assistance it can in the direction desired by the Ministry.—*Editor.*]

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PICTURE STAMPS TO HELP THE RED CROSS

The Red Cross Agriculture Fund—whose object is to raise at least £1,500,000 for the Red Cross for farmers, smallholders, poultry-keepers, gardeners, all having an interest in country things or land—has devised an interesting method of helping the cause. They have produced a series of picture stamps depicting leading specimens of all the most important breeds of pedigree livestock, cows, pigs, sheep, horses and goats. The stamps, which are in sheets of 60, all different, are priced at 1d. each or 5s. 0d. the sheet. Any desiring to help the Fund by this means should purchase one or more sheets, either to retain the stamps themselves as a memento or to re-sell, at 1d. a time, to friends. It is obvious that the collection of these stamps will be very popular with children. Once they start, their aim, of course, will be to complete the set. The stamps, which have sticky

backs, are beautifully finished, making splendid photographic reproductions. These stamps are obtainable either from *The Smallholder* office, Tower House, Southampton Street, Strand, London, W.C.2, or from the Secretary, The Red Cross Agriculture Fund, 30, Belgrave Square, London, S.W.1. Only full sheets can be supplied and remittances (5s. 0d. per sheet plus 2½d. for postage) must accompany each order. All who buy these stamps will help the most important of all war charities.

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FOOT-AND-MOUTH DISEASE IN LINCOLNSHIRE

The existence of foot-and-mouth disease has been confirmed among cattle at Braceby, Lincolnshire, and parts of Kesteven. The area subject to restrictions in the movement of animals lies within the counties of Lincolnshire, parts of Kesteven and Holland, Rutland, Leicestershire, and Nottinghamshire.

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SWINE ERYSIPELAS

"The active season for swine erysipelas is now at hand and disease may occur in unvaccinated pigs, chiefly fat pigs," states the Ministry of Agriculture in a recent announcement, which continues: "Pig owners should, therefore, take the following steps to minimise losses when the disease occurs. Affected pigs and those that have been exposed to infection should be treated with serum alone, which will confer a temporary protection to tide the pigs over the acute stage of the outbreak. A fortnight later pigs that remain healthy should be vaccinated to give them a lasting immunity. Vaccination, which in this case means the injection of serum and of living germs, is deferred for a fortnight because it might prove fatal to pigs that had already contracted infection. Recovered pigs are immune and need not be vaccinated.

"During the course of an outbreak carcases should be buried in lime and the manure and sties disinfected. Affected pigs and those in immediate contact should be isolated as far as possible, and no pigs should be brought on to the premises. Pigs should not be sent away except for immediate slaughter and in selecting these, particularly at the beginning of an outbreak, care should be taken to detect any pig in the earliest stage of disease. Such a pig is likely to produce a discoloured carcase, which may be condemned as unfit for food and therefore should not be sent for slaughter. The treatment of a pig with serum does not affect its carcase value.

"Veterinary advice should be sought immediately the disease is suspected because of its possibly rapid spread in the herd, particularly among pigs nearly ripe for slaughter."

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DRAUGHT HORSES FAVOURED

On the ground of economical management, states the *Farmer and Settler* (Sydney), the use of draught horses on the farm is advocated by the New South Wales State Government. Emphasising this, Mr. Mair, the Premier, has told the Commonwealth Clydesdale Horse Society that he thinks that the horse is undoubtedly the best means of traction for the average size farm.

"More than at any other time in the history of agriculture," said Mr. Mair, "it is necessary to produce economically. Past experience seems to establish the fact that unless very favourable prices continue year after year the average farmer inevitably drifts into financial difficulties in order to meet tractor commitments."

The indiscriminate use of tractors, added the Premier, had contributed, both in Australia and elsewhere, to the over-production of primary produce, and so to the depreciation of market values. With wheat, excess production was approximately 10 per cent. This was practically equal to the amount that, if horses were employed, would be used for feed on the farm. The Department of Agriculture used horses for power on its experiment farms.

A Bill providing for the registration of stallions, thus meeting Clydesdale breeders' wishes, has been prepared for submission to Parliament.—*Scottish Farmer.*

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ROYAL SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS

Sir Robert Gower, M.P., Chairman of the Royal Society for the Prevention of Cruelty to Animals, speaking at the annual meeting recently held in the Wigmore Hall, said that the scheme for providing qualified diagnosis and treatment for the sick and injured animals of the poor, started in 1909, when there were 19 patients, had been continued, and during the past year no fewer than 341,480 received attention, representing an increase of 20,000 over the year before and 140,000 within the last five years.

Referring to the effects of the war on the work of the organisation, Sir Robert Gower said that for some inexplicable reason a large number of the London public felt it their duty to have their pets humanely put to sleep on the outbreak of war, no doubt with a view to saving them from possible injury and pain as a result of air attack. Exactly how many were dealt with during the first days of war he could not say, but the figure was estimated at 750,000. While the London clinics were meeting the emergency, over 500 pet animals and birds, including an alligator, were being evacuated from London County Council schools and taken by the society's officials to a place of safety.

The petrol restriction meant that a vast number of mechanically propelled vehicles had disappeared from the roads and fields, and horses and mules had taken their places. This meant that there was a need for greater vigilance than ever on the part of the society's inspectors.

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STERILIZATION OF DAIRYING EQUIPMENT

The production of clean milk upon the farm depends upon the adoption of correct methods of management not only in the cowshed but in the dairy, and, as veterinarians are fully aware, the sterilisation of utensils plays a very important part. Furthermore, the degree to which mastitis is present on the farm is often directly proportional to the efficiency of the methods adopted. These vary greatly from farm to farm, depending upon personal initiative and available facilities.

For those who have access to electricity the booklet recently issued by the General Electrical Company Ltd. entitled "Electric Sterilising Equipment for Dairies," should prove of considerable interest. A full range of chests and steaming units for sterilising bottles, churns, teat cups and other apparatus is illustrated and described. These now incorporate immersion heaters having automatic cut-outs which prevent them from burning out if the water should fail.

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Imperial Cancer Research Fund

At a meeting of the Council of the Imperial Cancer Research Fund, held at the laboratories of the fund at Mill Hill, Sir Humphry Rolleston was re-elected Chairman and Professor H. R. Dean Vice-Chairman of the Council for the ensuing year. Sir Archibald Sinclair has accepted the post of Vice-President of the fund. Dr. Leslie Foulds was re-elected Elizabeth Wills Allen Fellow and Dr. R. J. Ludford Alice Memorial Fellow for the ensuing year.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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"RESERVATION" OF THE PROFESSION

To the Editor of the Veterinary Record

Sir,—I am in complete agreement with the view that it is of little avail for individual members to declaim against the "reservation" of our profession. Those powers governing this matter have decided that for the present we should, in the best interests of the country, remain totally reserved. It is obvious, therefore, that for the present our job is to continue to practise our profession with cheery good humour and not to bemoan our misfortune in being denied the privilege of serving in one or the other of His Majesty's Armed Forces.

It is no less obvious that if it is at all possible to maintain the necessary veterinary service throughout the country with fewer veterinary surgeons then we are in honour bound to make our contribution in man power. If such a contribution is to be made by our profession I hope it will be a voluntary one—meanwhile I have the faith in those in authority to remain assured that our "reservation" will be altered just as soon as it is possible and when it is expedient to do so.

Yours faithfully,

"Melverne," W. T. Richardson.
West Hill,
Wadebridge.
June 14th, 1940.

. . . . . .

To the Editor of the Veterinary Record

Sir,—I agree with Mr. Threlkeld that the student's primary duty is to qualify—that is his job at the moment, and he should get on with it; but our objection to the present position of some qualified men is that they have no job to get on with. This being the case they are just waste man power.

Primarily our duty is to attempt to cure sick animals; in war this is a necessary service and, being such, only the best service is good enough. It has been made abundantly clear that there are experienced members only partly employed or wholly unemployed. These are the men who must be put to work in the profession that the service to the agricultural community may be the best available. Absorption of unemployed veterinarians must take place, and from the top. If there is a residuum left, and I believe there will be when saturation point is reached, this will consist of young men who have nothing but personal comfort to lose in the service of their country.

During the last war many veterinarians were taken from practice to serve in the R.A.V.C.—this is not likely to happen again. Surely the profession can spare some of us now, as it was compelled to do before, instead of enforcing on us an extremely demoralising idleness.

Yours faithfully,

38, Upper Tooting Park, P. H. J. Keast.
London, S.W.17.

. . . . . .

To the Editor of the Veterinary Record

Sir,—To whom or what is Mr. McGuire's loyalty and duty consciousness directed? What is his view of the sentiments expressed in Mr. Beckett's letter of May 26th, and are he and Mr. Beckett "for or agin" the Government?

Is Mr. McGuire accurate in his sweeping statement that "ours is the only occupation which has decreased in national output," and has it? I have not noticed any marked diminution in general agricultural veterinary practice nor in any of the scheduled diseases.

Animal A.R.P. suffers only from the same disease as A.R.P.—lack of discipline and too many personal opinions. The gibe at the National A.R.P. for Animals Committee and the gentlemen of our profession who are attempting to give us some kind of organisation under great difficulties, is cheap and ill-considered.

The statement that the reservation is a shirker's cloak is only likely to be disturbing to young graduates and students who are doing their duty in work of national importance. I hope that none of these young men and women will do other than give commonsense consideration to these fiery and pseudo-patriotic sentiments of Messrs. McGuire and Beckett, give loyalty to the N.V.M.A., and continue to do their duty in this service that the State at present requires from them.

Yours faithfully,

The Vineyard, B. G. Catmur.
Abingdon,
Berks.
June 12th, 1940.

. . . . . .

To the Editor of the Veterinary Record

Sir,—I feel that I ought to reply to the letter written by the Hon. Secretary of the Students' Union Societies Committees, Streatley House, Streatley, and his reference to Mr. F. Beckett, F.R.C.V.S.

I know that Mr. Beckett will be too modest to reply, in the way that he ought, to this "student." I think that Mr. Beckett is one of the finest sportsmen who entered the Veterinary College. Not only that, he gave his services during the last war and did not come back without *many* wound scars.

I do think that before students are allowed to write letters in the *Veterinary Record* they should be made to know of whom they are writing, thereby not giving a false impression to people who have not met Mr. Beckett.

I might add that I have not seen Mr. Beckett since 1924, nor have I corresponded with him in any way, but I feel that I am justified in writing this letter.

Yours faithfully,

James Storrar.

Veterinary Infirmary,
Newgate Street,
Chester.
June 15th, 1940.

* * * * *

"DUTCH VET."

To the Editor of the Veterinary Record

Sir,—We are all proud of the lengthy description "Veterinary Surgeon," but surely the more sensitive members of our profession would save themselves innumerable twinges if they made up their minds to put up with, if not to enjoy, the vulgar but friendly abbreviation "vet."

The word is stunted and unpleasing, but being dwarf-like does not prevent it from being a useful and genuine substitute for a mouthful which even a wireless announcer recently made three unsuccessful attempts to pronounce.

"Vet." is easy and honest and is understood throughout the country to indicate the qualified practitioner, and we should be proud of its parliamentary usage as a verb meaning to examine with scrupulous care.

The next time Mr. Hypersensitive, M.R.C.V.S., enters a farmyard and the boy shouts "Here's the vet., Dad," I hope the reply will be, "Thank you, Harry," instead of an explanation that the correct title is "Veterinary Surgeon" (with perhaps instructions on how to omit the second syllable and slur the third) or just a sour look.

To adopt Dr. Scott's simile, we are just as likely to remove "vet." from the farmer's vocabulary as cobwebs from his buildings, and we might as well realise that while they are both unaesthetic they both have their uses.

Yours faithfully,

A. C. Fraser.

Veterinary Establishment,
Lambourn,
Berks.
June 11th, 1940.

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